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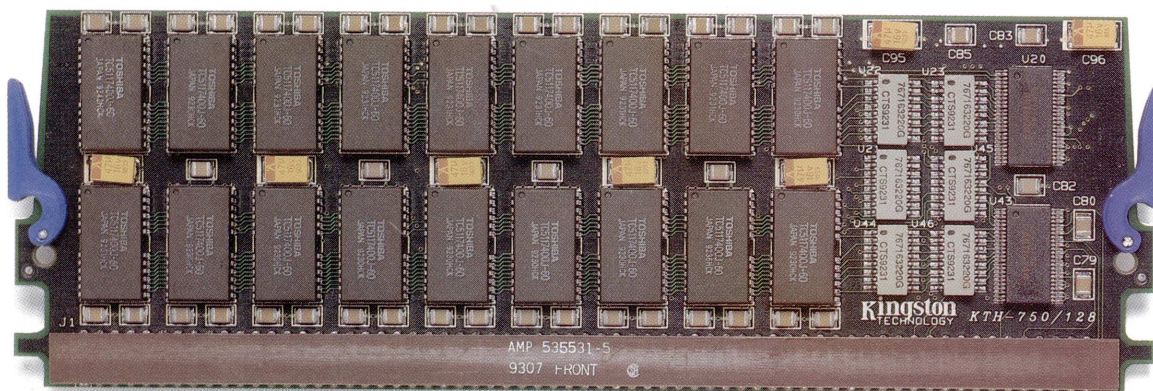
Hands-On Solutions for HP-UX Users • May 1994

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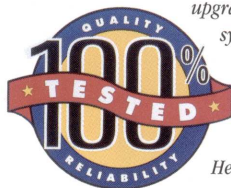


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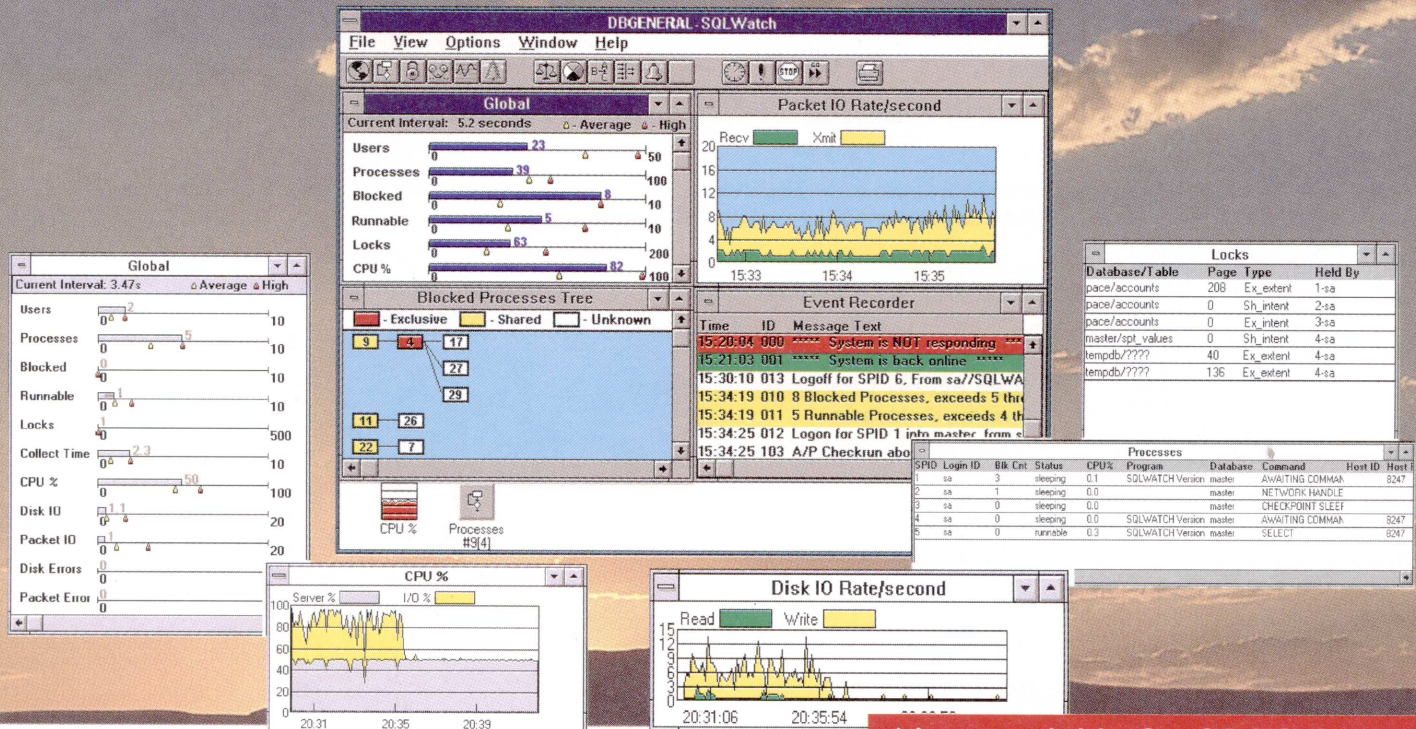


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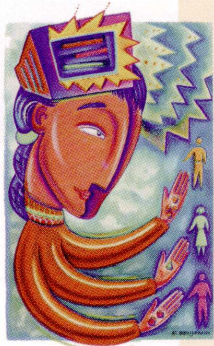


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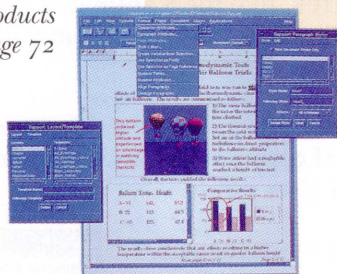
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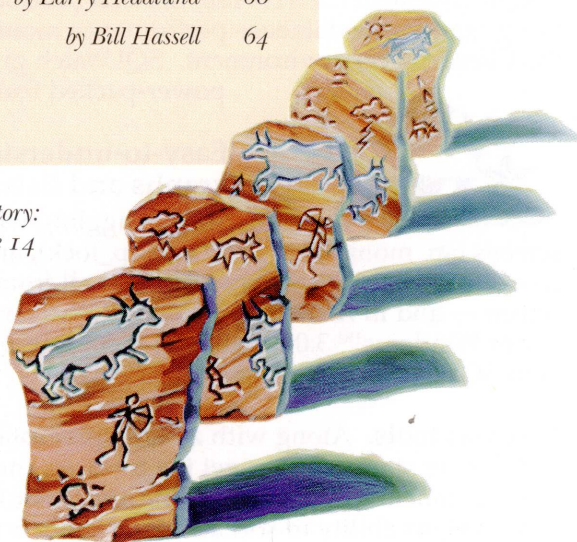
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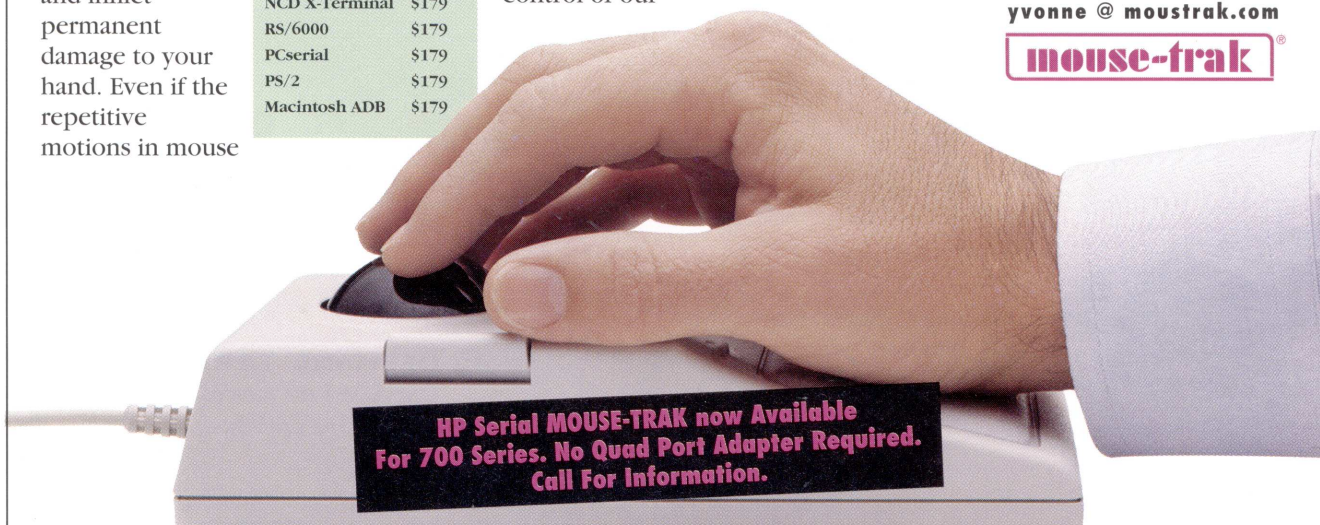
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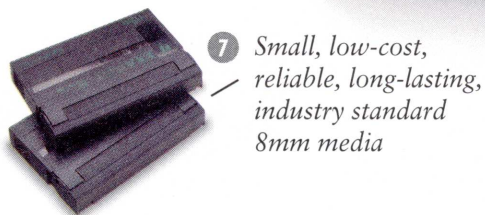
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Question & Answer

CORRECTION

On page 10 of the January 1994 issue, second column the code is missing a trailing semicolon (;) and two parameters in the *execlp* system call.

It should read:

```
#include <stdio.h>
#include <unistd.h>
main()
{
    if (execlp("/usr/local/bin/myscript","",NULL) < 0)
    { fprintf(stderr,"Cannot execute /usr/local/bin/myscript\n");
      perror("/usr/local/bin/myscript");
    }
}
```

Q: Can anyone give me a reason why *xwd* should suddenly stop capturing PHIGS (and Starbase) output on an X display when Motif is involved?

A: This is because the top-level window is now a window in the default visual while a PHIGS rendering is contained in a non-default visual window (which is a child of the top-level window). When you invoke *xwd*, you end up giving it the ID of the top-level window (or perhaps the root window). *xwd* assumes that all it need do to capture the region of interest is to perform an *XGetImage* call to the window ID supplied and then map that data to the colormap associated with the window. This assumption is not completely true.

To do the job right *xwd* really should

traverse the window tree, create a list of visible windows in the region of interest (these can be grouped into sets having the same visual and colormap), and then perform separate *XGetImages* for each of these regions, translating the returned data through the appropriate colormap and merging the images into a single bitmap.

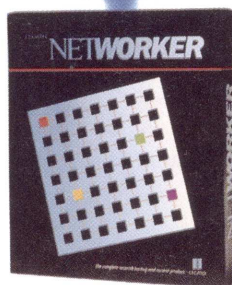
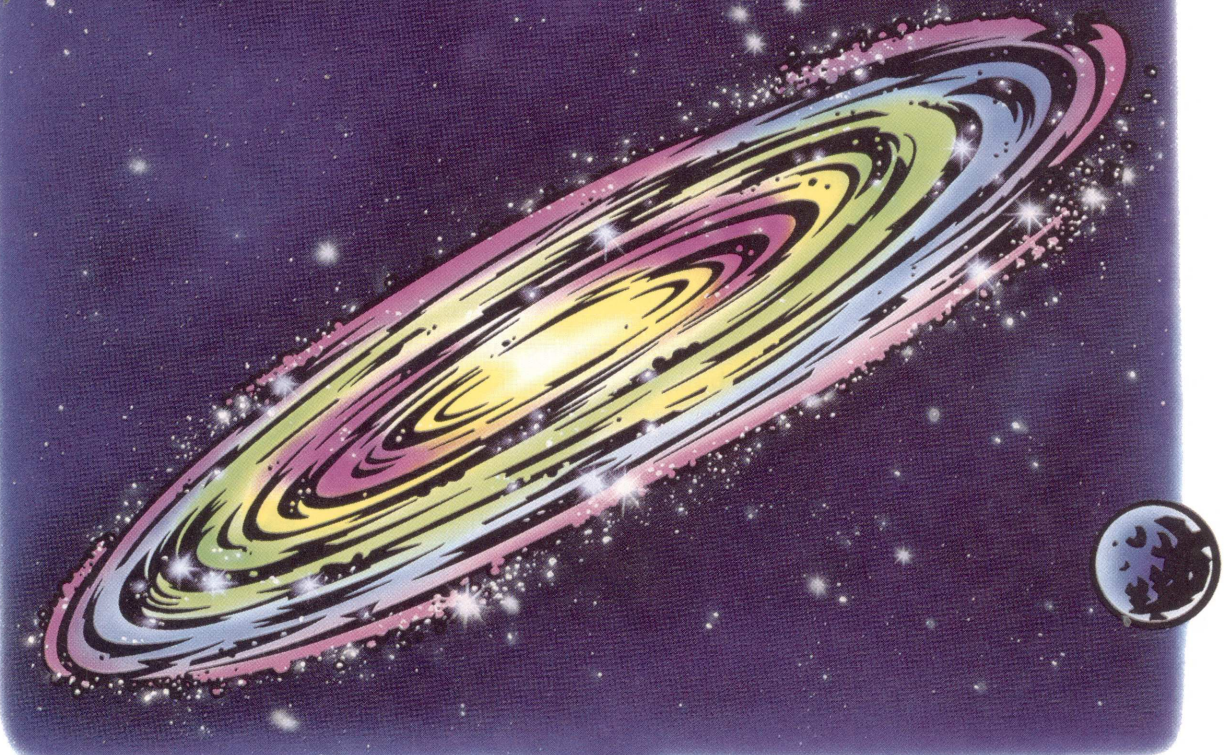
For a really thorough job, it can then go on and deal with the potential use of the overlay transparency index (by a client), which can cause image-plane-based windows contents to be visible through "holes" in obscuring overlay plane windows.

Here are three potential workarounds to your problem.

1. Use *xwininfo -tree* to inspect the window tree under your widget and then pass the ID of the real PHIGS window to *xwd* via the *-id* option as in



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```
xwininfo -int -tree
```

(to find the true ID number), then pick the window of interest by id number using *xwd*:

```
xwd -id XXXXXX | xpr ... | lp ...
```

2. Use the MPower or Shared/X whiteboard utility to capture the image. It's smarter about this multiple visual/colormap business.

Q: How can I trace *hpnpf* activities (JetDirect for TCP/IP)?

A: In tracing connection problems for JetDirect, you may need to trace *hpnpf* activities during execution of the model script. To do this, you can use the logging facility as mentioned in the man page:

```
hpn -x <printer_name> -l logfile ..other options..
```

Write verbose logging information to logfile. The logging messages are detailed messages about what *hpnpf* is doing. Included in the messages are how many bytes are read and written to the network connection. If this option is omitted, no logging is performed.

Be sure that the logfile is specified. Use a full pathname as in:

```
hpnpf -l /tmp/hpnpf.log ...other options..
```

If the model script is not getting executed at all, there will be no log output. The log is cumulative, so it may be advisable to add a time stamp prior to the *hpnpf* line as in:

```
...
#
# Save the stderr messages in a temporary log file
# and discard stdout which is the peripheral output.
#
rm -f $LOG
> echo "----> `date` Starting hpnpf request" >> /tmp/hpnpf.log
> if $REALMODEL "$@" | $HPNPF -l /tmp/hpnpf.log -x $PERIPH -v
...
then
...
```

Notice the two lines marked with >. These are the changes to add logging to the

file */tmp/hpnpf.log*. Be sure to use the grave accent mark (`) and not the apostrophe (') around the date command.

Q: How do I determine which computer is connected to a JetDirect printer?

A: Suppose that for TCP/IP connections several host computers have access to a JetDirect printer, but one of the systems has started printing a huge job incorrectly. To cancel the job requires knowing which system started the job, and *hpnstat* will provide this information. Use the command:

```
/usr/bin/hpnstat -a <name_of_prn>
```

where *name_of_prn* is the network printer name. To see a history of connections, you can use */usr/bin/hpnstat -A*, which shows the ARP cache held on the card. In all cases, when the printer is connected, you will see the word: ESTABLISHED on the line corresponding to the currently printing job. If no ESTABLISHED line exists, it may be that the job has been completed and internal printer buffers (which may be quite substantial) are just being emptied. In this case, remove the paper tray to stop printing and then perform a hard reset from the front panel (or cycle power to the printer).

Q: I just had a panic on my Series 800:

```
Panic: iogettimer: out of timers
```


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What does this mean?

A: The SCSI Driver, `scsil`, now implements command queuing. Some peripherals, such as the C2247, support this feature and may require that the number of timers in the kernel be increased.

The parameter for this is called `ncallout`. The following formula can serve as a guide for calculating `ncallout`:

$$\text{NPROC} + (\text{old } ncallout \text{ value constant}) + (18 * 2 * \text{###})$$

where `###` is the number of mechanisms on this system that support command queuing.

NOTE: Failure to increase the number of timers in the kernel could result in a kernel panic. You would get the following message:

```
iogettimer: out of timers
```

The disks that support command queueing include:

- 1- and 2-GB single-ended SCSI disks.
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- Fast and Wide 1- and 2-GB disk drives.
- Fast and Wide 535-MB 3.5 inch drives.

Fast and wide devices are supported starting with revision 9.04 and the SCSI driver implements command queuing at that revision. This should not be a problem with 9.0 or earlier revisions.

General HP-UX and 9000 questions are answered by Bill Hassell, a support engineer at the HP Atlanta Response Center. He can be contacted at his e-mail address, which is blh@hpuaatl.hp.com.

700 Workstations

Q: I recently installed SICL, the Standard Instrument Control Library, on my HP 9000/725 workstation. The installation went OK with no errors and the kernel was rebuilt at the end of the install. Now, however, when I try to build a new kernel through SAM or manually, I get the following error:

```
ERROR: Cannot configure kernel: /etc/config failed. Details
       are in log file /tmp/update.log.
```

In the `/tmp/update.log` file the following error was logged:

```
pil
config: No such device
Configuration aborted.
```

A: The problem is that `pil` could not be found in the master file located at `/etc/newconfig/master`. To correct this problem just copy the `pil` line of `/etc/master` file to the `/etc/newconfig/master`. The line should look like the following:

```
pil      pil      1      1F9      -1      58
```

Q: I recently installed an E2071I High Speed HP-IB card and SICL on my HP 700 series computer. The installation instructions provided directions on how to configure the switches on the E2071I card. However, during the software configuration, an error was logged to the `/etc/eisa/config.err` and `config.log` files saying that the E2071I's switch settings were incorrect. What should these settings be? The error in the files suggest that the documentation is wrong.

A: You can disregard the error in the `/etc/eisa/config.err` and `config.log` files; there is a known problem with E2071I cards and the `eisa_config` routine that causes the erroneous error to be reported. The correct settings for the E2071I board DIP switch will conform to those shown in the `/usr/pil/defaults/hwconfig.cf` file. The

following four entries in *hwconfig.cf* show the required settings:

```
# HP E2071I Card (ISA/EISA High Speed HP-IB Interface Card):
# <lu> <symname> e2071 <slot_num> <hpi_b_busaddr> <dip> <sysctl> <irq>
# Default HP-IB Card
#7    hpi_b e2071 1 21 0b0000 1 3
# Uncomment the following lines for the 2nd thru 4th card:
# Note that only slots (1,3) or (1,4) or (2,4) are allowed combinations,
# since two HP-IB cards cannot sit in two consecutive slots (mechanical
# mounting won't work).
#8    hpi_b2 e2071 2 21 0b0100 1 10 # Card in second slot (Slot #2)
#9    hpi_b3 e2071 3 21 0b1000 1 5  # Card in third slot (Slot #3)
#10   hpi_b4 e2071 4 21 0b1100 1 7  # Card in fourth slot (Slot #4)
#
```

The <dip> settings in this file are how the DIP switches on the card are configured. These setting do not reflect the card slot but the card's base address in the EISA

backplane. Figure 1 is a diagram of the E2071I card and the possible switch settings.

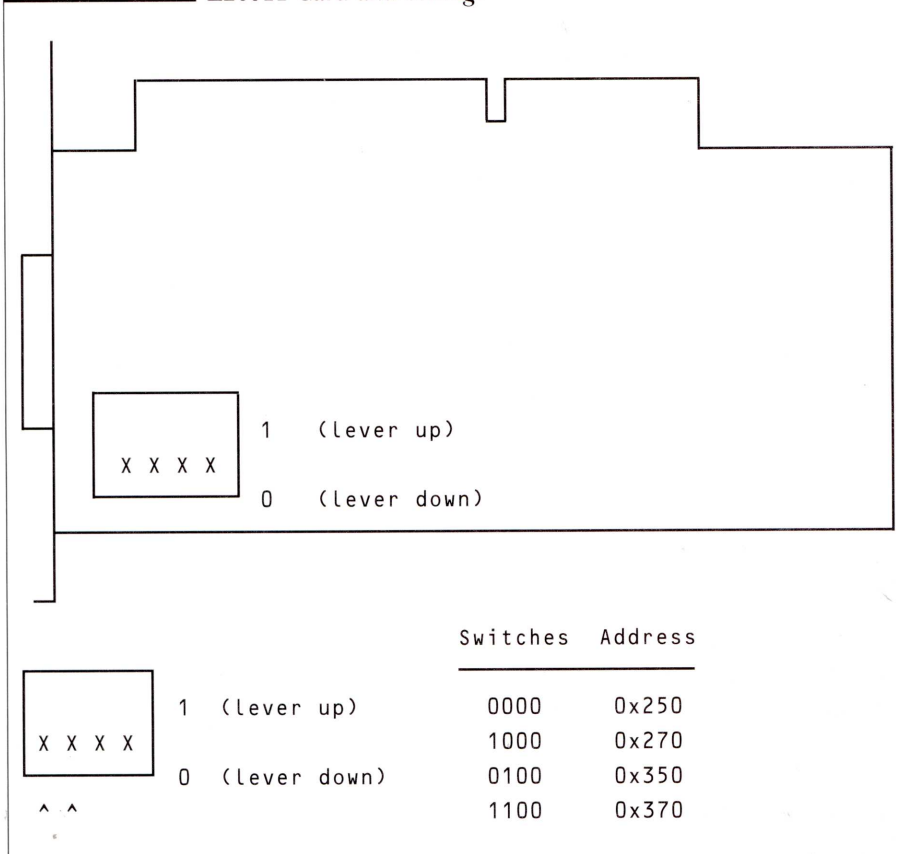
Q: I have an older HP 9000 Series 310 computer that runs the Rocky Mountain Basic 4.03 operating system. I am interested in upgrading to an HP Series 700 workstation running the HP-UX operating system, but I have a significant amount of software I developed that I would like to move to the new machine. Is this possible? Which 700 and what version of HP-UX will I need?

A: Yes, with certain limitations. BASIC/UX 7.0 for the Series 700 has just been introduced (product number E2045A). This product is an emulation of the Rocky Mountain Basic operating system running over HP-UX 9.x on the 700 platform. BASIC/UX 7.0 should allow you to upload your existing code with a few exceptions I will explain.

First, the emulation of the old RMB operating system does not control the hardware at the register level as the operating system did, but has to use the HP-UX kernel to communicate with the hardware. Because of the different hardware control scheme and newer hardware and display capabilities, you may see differences in the behavior of your graphics programs.

Next, any compiled code or Csubs will have to be recompiled under BASIC/UX 7.0 to be compatible. Next, BASIC/UX 7.0 will not support CS80 disk drives or any media devices through HP-IB, although it will support the LIF format on the built-in 3.5 SCSI floppy drives on the 700. Finally, BASIC/UX

FIGURE 1 E2071I Card and Settings



7.0 will only support printing through the HP-UX print spooler. This means that instead of using `PRINTER IS 701`, the typical BASIC program line executed would be `PRINTER IS "|lp"`. This is really invisible in most cases except that no information will be output out the pipe until it is explicitly closed. This method of print spooling is the same as the other BASIC/UX products running on the HP Series 300 platforms. You should be able to use your existing code with minor modifications to accommodate the limitations I have highlighted.

The hardware needed to run BASIC/UX 7.0 is pretty straightforward. You can run BASIC/UX on most 700s except the new 712. You will also need to order an E2070A or E2071I SICL HP-IB card if you need HP-IB I/O capabilities. The SICL HP-IB cards connect to the 700 via an EISA backplane that is not found on the low-end 700s; this means you will need a 715 or better machine. To be able to upload your existing code to the 700, you will want a 3.5 floppy drive built-in with the 700 you choose. While this not the only way to move your code to the 700, it is the easiest method. Finally, the 700 needs only the standard display because BASIC/UX 7.0 does not support the CRX accelerated displays.

Q: When BASIC/UX is running on my workstation other applications cannot access the HIL ID module, is there a way to prevent this?

A: This is because BASIC/UX at bootup takes control of all available HIL devices. To prevent this, set up an AUTOST file that issues a "SET HILMASK 0"; this will allow other applications to read the ID module.

Q: I have an HP 382 computer that is a cluster server for three other 382s as client cnodes. I am running HP-UX 9.0 and BASIC/UX 6.3. I run BASIC/UX on the server and the client nodes. My problem is that when BASIC/UX is running on the cnodes I cannot get print request sent to the spooler to print on the cnode's parallel port. However, if BASIC/UX is not running on the client node the request to print to the cnodes parallel port works fine. I can run BASIC/UX on the server node with no adverse effect on the print spooler.

Why does BASIC/UX prevent me from spooling to the clients parallel port and how do I correct this problem?

A: The key to your problem is in how the kernel communicates through the parallel port. The driver for the parallel port uses the Device I/O libraries, sometimes referred to as the DIL libraries, to control the port. The kernel contains a variable named "ndilbuffers" which defines the number of DIL-based device files that can be open at any one time. The default setting for this variable is 30 for the server's kernel, but cnode kernels are built by default with ndilbuffers set to 1. BASIC/UX during its bootup opens the HP-IB interface for I/O, which uses up the one ndilbuffer allocated in the cnodes kernel (the HP-IB interface uses the DIL libraries). This is why you are unable to spool to the parallel interface while BASIC/UX is running. When you exit BASIC/UX, the one ndilbuffer is freed and the lp spooler is able to open the parallel port. To correct this behavior just rebuild the cnodes kernels with ndilbuffers set to the number of DIL devices you expect to have open at any one time.

Q: I use BASIC/UX 6.3 on an HP 9000/382 computer to draw graphics that I later would like to plot on a plotter. I start by using `PLOTTER IS "myPlotfile"`, which directs the HPGL commands to the file *myPlotfile*. This works OK; however, later, when I try to spool the file out to a 7475A plotter, it does not plot correctly. I have tried troubleshooting this by drawing a simple square to my file and then spooling the file out to my plotter, but what it plots is a shape similar to a triangle. Now if I use the contents of the file to plot to the CRT I get the expected simple square, what could be going wrong?

A: The problem is that you did not specify the plotter limits in your command `PLOTTER IS "myPlotfile"`. The `PLOTTER IS` command hard clip limits default to a D-size drawing—the size for an HP 7580 plotter. The limits of your HP 7475A are much smaller than this. To correct this behavior try using `PLOTTER IS "myPlotfile",Xmin,Xmax,Ymin,Ymax`, where *Xmin,Xmax,Ymin,Ymax* are set to the limits for the plotter you expect to spool to later.

Q: My users log into different nodes that run BASIC/UX at login. Is there a command that can be sent from BASIC/UX to tell the operator which machine he is logged on to?

A: Yes, this can be accomplished by an AUTOST program such as the following:

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question & answer

```
10 DIM Name$(80)
20 ASSIGN @Machine TO "uname -a |"
30 ENTER @Machine;Name$
40 PRINT Name$
50 END
```

Q: How do I merge two program files with BASIC or BASIC/UX?

A: You use the GET command as shown in the following example to create a new program merging file1 with file2:

```
LOAD "file1" ( file containing lines 10 thru 120 )
SAVE "file1" ( this saves file1 as an ASCII file )
LOAD "file2" ( file containing lines 10 thru 100 )
GET "file1",99,10 ( start appending file1 at line 99 beginning with line 10 )
RE-STORE "newprogram"
```

The example above shows the steps required to merge file1 with file2. File1, beginning at line 10, is merged into file2 beginning at line 99. The result is then stored as newprogram. ■

Rudy Stanley of the Hewlett-Packard Response Center in Atlanta, Georgia, answers workstation questions.

AWK Programming

b y D a v i d L . T o t s c h



Illustration by Karen Tokmakoff

Saying AWK out loud in public with any frequency can be social suicide. Not knowing AWK in the UNIX environment can be almost as inhibiting. AWK may be defined many ways: 1) as a text pattern scanner, 2) as a highly programmable editor, 3) as an output processing and formatting facility, 4) as a programming language, or 5) merely as a complex system command. It is all of those, but it is most conveniently thought of as an interpreted programming language (just to bunch all of the definitions together). No matter how you define AWK, it is a powerful and useful tool.

AWK was created as an augmentation to SED and GREP; the authors wanted a more functional way of dealing with both numbers and text. So, Aho, Weinberger, and Kernighan developed AWK. Since then, its abilities have attracted enough users to warrant expansion to a new AWK (NAWK) and incarnations on other operating systems such as DOS. I hope you, too, will recognize the rich capabilities of AWK and begin to use it often.

Getting Started

Although you may write longer AWK programs, you will find short one- to four-line programs the most useful. Short examples are also a good way to pick up something new. Let's say you have output that is fairly columnar and you want to grab just one column, but you do not want to end up counting characters to identify the column. A good example would be getting the file creation dates from a long listing of files:

```
$ ls -l
total 12
-rw-r--r--  1 dtotsch  training  1820 Mar 20 10:30 STNG
drwxr-xr-x  2 dtotsch  training    24 Mar 20 11:21 directory
-rw-r--r--  1 dtotsch  training    0 Mar 22 10:30 empty
-rw-r--r--  1 dtotsch  training  279 Feb 10 13:32 phone.list
```

Here is what you are looking for:

```
Mar 20 10:30
Mar 20 11:21
Mar 22 10:30
Feb 10 13:32
```

An AWK command line to get the output above would be:

```
ls -l | awk '{print $6,$7,$8}'
```

Counting the columns was much easier and faster than counting the characters to use the CUT command. AWK sees the field delimiter as white space by default. This means that AWK will skip one or more occurrences of spaces and tabs to delineate columns. Therefore, if you have output that does not follow the exacting columnar requirements of CUT, you will want to use AWK.

Now let's do something CUT cannot do. Let's transpose columns six and seven of the LS output:

```
ls -l | awk '{print $7,$6,$8}'
20 Mar 10:30
20 Mar 11:21
22 Mar 10:30
10 Feb 13:32
```

Running an AWK Program

An AWK command line has the following format:

```
awk [-Ffs] ['program'] [-f progfile] [datafile ...]
```

where

fs is a field separator other than white space

'program' is an awk program entered on the command line

progfile is a text file containing an awk program

datafile is the data file you want to pass throughout the awk program

In the example above, we saw an AWK program entered at the command line. An AWK program entered at the command line should be enclosed in single quotes to prevent the shell from interpreting the program (you do not want the shell to replace “\$6” with the sixth shell positional parameter).

Here are some examples:

```
ls -l | awk '{print $6,$7,$8}'
echo '{print $6,$7,$8}' > prog.awk
ls -l | awk -f prog.awk
awk -F":" '{print $1}' /etc/passwd
awk -f prog.awk data1 data2 data3 -
```

The first example we have seen before. The second example merely saves the program for our first example into the file prog.awk and uses that file. The third example prints the user ids from the password file (which is colon delimited). The fourth example uses the program in the file prog.awk and processes the data files data1, data2, data3, and then waits for the user to type in additional information (end by typing Ctrl-d). You may also set variables within your awk program on the command line, but we will get to that feature later.

Internal Variables

AWK automatically keeps track of valuable information with internal variables. We have already taken advantage of the internal variables that keep track of input fields (\$1,\$2,\$3...\$0 is the complete input line). These internal variables are dynamic; any one record may have more or fewer than previous or subsequent records. You can even assign them new values before output. Since the number of fields in a record can vary, AWK keeps track of the number of fields in the current record in the internal variable NF. It even keeps a running count of records in NR. Here is an example of both:

```
awk '{print NR, $0, "FIELD COUNT:", NF}' -
one
two two
three three three oops
```

```
four four
^d
```

```
1 one FIELD COUNT: 1
2 two two FIELD COUNT: 2
3 three three three oops FIELD COUNT: 4
4 four four FIELD COUNT: 2
```

Note that I have separated the output from the input for clarity. In interactive mode, AWK actually reads an input record (line) and then processes it, so on your screen you would see a line of input and then a line of output. AWK will also substitute the value of an internal variable when it is preceded by a dollar sign. Therefore, '{print \$NR}' will print the last field of each record. See *Table 1* for a list of Internal Variables and their meanings.

TABLE 1 *Internal Variables*

ARGC	count of command line arguments
ARGV	array of command line arguments
FILENAME	current input file name
NF	field count for current record
NR	count of records read so far
FNR	count of records read from current input file
OFMT	output format for numeric fields
FS	input field separator
RS	input record separator
OFS	output field separator
ORS	output record separator

There are also internal variables that control how AWK determines input and out fields and records. By default, record separators are carriage returns and field separators are blanks and tabs. You may reset these internal variables, but let's learn some more basic stuff first.

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CIRCLE 99 ON READER SERVICE CARD

AWK Program Structure

The AWK programming structure is rather simple and is of the form:

```
pattern { action }
.
.
.
pattern { action }
```

AWK applies the pattern to each input record. If the input record matches the pattern, the action is applied to that line. As we have seen, a blank pattern matches every record. So far, our only action has been to print fields of the record or the complete record.

Patterns

Before we can perform an action, we have to match a record to a pattern. Records can be matched by scanning all fields or by matching one particular field. Here is a list of examples:

```
/findtext/      - record contains string "find
                  text"
$1 ~ /findtext/ - field one contains string "find
                  text"
$1 !~ /findtext/ - field one does not contain
                  string "findtext"
NF != 3         - records where the number of
                  fields is not equal to 3
$2 == 5         - field two is numerically equal
                  to five
$1 == "text"    - field one consists of the text
                  string "text"
$2 == $NF      - field two is the same as the
                  last field
```

Patterns may also be arranged with logical operators:

```
$2 >= 4 || $3 <= 20
```

This will match a record where field two is greater than or

equal to four, or field three is less than or equal to 30. The logical operator for AND is "&&".

There are also two special patterns. "BEGIN" matches before the first input record (handy for setting variables). "END" matches after the last input record (handy for final output).

Regular Expressions

Matching string patterns can be as simple or as complex as you please since AWK supports the same regular expression ability as GREP and SED. As we saw above, to match a string pattern you use */findtext/*. Instead of using a literal string such as 'findtext', you may replace it with a regular expression.

Let's say I am looking for records that contain my name and I only want to match "david" and "David". My AWK pattern would look like this:

```
/[Dd]avid/
```

See *Table 2* for a partial listing of regular expression meta-characters recognized by AWK.

TABLE 2 *Regular Expression Meta-Characters*

^	beginning of line
\$	end of line
.	any single character
[]	denotes character class
	a leading ^ inside brackets matches complement ([^ABC]
	matches any character except A, B, or C)
	alternation ("X Y" matches X or Y)
*	closure ("X*" matches zero or more X's)
+	positive closure ("X+" matches one or more X's)
?	zero or one ("X?" matches null string or X)
()	parentheses; groups regular expression so that meta characters
	may apply to a regular expression
\	negates the meaning of a meta character ("\" will match ".")

AWK also allows you to group patterns. Place groups of patterns within parentheses and separate them with a pipe symbol.

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CIRCLE 124 ON READER SERVICE CARD

(BOZO|COOKIE|WIZZO) (UP|DOWN) (TO|YESTER)DAY

would match 12 strings, of which the following are three:

BOZO UP TODAY
COOKIE DOWN YESTERDAY
COOKIE UP YESTERDAY

A grouping may also have a meta-character modify its behavior.

(AB)+c

would match any of the following:

ABc
ABABc
ABABABc

(Remember that the meta-character “+” is positive closure—it matches one or more occurrences of the character or group that precedes it.)

Just to demonstrate how involved regular expressions can get:

/^(\+|-)?[0-9]+\.[0-9]*\$/

Yikes! What does that mean? A cartoon character just stubbed his toe, right? No. It matches any input record that consists of only a decimal number with an optional sign and optional fraction. An exact interpretation reads:

^	beginning of line
(group
\+	escape the meta meaning of “+”, literally a “+”
	an OR within a grouping
-	literally a “-”
)	end of group
	the group is a plus sign or a minus sign
?	match zero or one of the preceding group
[0-9]	character class of all numbers
+	match one or more of the preceding class
\.	escape the meta meaning of “.”, literally a “.”

?	match zero or one of the preceding characters
[0-9]	character class of all numbers
*	match zero or more of the preceding character class
\$	end of line

To repeat, the beginning of the field “^”, an optional plus or minus sign “(\+|-)?”, at least one number “[0-9]+”, an optional decimal point “\.”, possibly followed by more numbers “[0-9]*” and nothing else to the end of the field “\$”. That is a mouthful, but it is a good example of how to interpret regular expressions—one chunk at a time.

Ranges

Just before you have a chance to master regular expressions, I want to introduce the concept of pattern ranges (I have an obligation to keep computer addicts overloaded and therefore happy). AWK allows you to specify a start pattern and a stop pattern. AWK will match records between occurrences of the patterns given, inclusively. Given the range

/BOZO/,/PROFANDY/

and the following data:

BOZO tricks COOKIE
WIZZO botches magic trick
PROFANDY plays music
PROFANDY gets cream pie
BOZO chases COOKIE with pie
BOZO sings to audience
PROFANDY talks with GOLLY
WIZZO performs magic trick
WIZZO receives cream pie

AWK would give the output:

BOZO tricks COOKIE
WIZZO botches magic trick
PROFANDY plays music
BOZO chases COOKIE with pie
BOZO sings to audience
PROFANDY talks with GOLLY

Notice that the range repeated over the input data (two ranges were printed).

Dealing With Numbers

Aside from its ability to select records based upon what appears in them, AWK also shines when you need to perform calculations on fields within records. Should you have data that looks suspiciously like a spreadsheet, you can verify the calculations, or even do them over if you wish. Add some of the record selection criteria to the AWK program, and you can build some very interesting "macros"! Table 3 lists the available operators.

TABLE 3 *Operators*

+	addition
-	subtraction
*	multiplication
/	division
%	remainder
^	exponentiation

Here is an example:

```
awk '{print $1 + $2, $1 * ($1
      + $2)}' -
2.5 1.25
2 3
1 1.25

3.75 9.375
5 10
2.25 2.25
```

Again, this is an interactive AWK program and I have separated the output from the input for clarity.

Flow Control

AWK begins to look more like a programming language when you add flow control to your actions. Here are the programming constructs AWK provides:

```
if (expression) statement [else statement]
while (expression) statement
for (expression;expression;expression) statement
for (variable in array) statement
do statement while (expression)
break
continue
next
exit [statement]
```

Portions delimited with brackets are optional. Multi-line statements must be contained in braces.

For example, suppose you have a sorted file with the names of payees, the date the amount was paid, and the amount paid. Let's say you want to total the amount for each payee. You know the file is sorted, so you can output and reset the total each time you encounter a new payee. You also have the following data:

```
John 11/22/91 100.00
John 10/22/91 100.00
John 09/20/91 50.00
John 08/22/91 100.00
MaryJane 11/22/91 50.50
MaryJane 10/22/91 50.50
MaryJane 09/22/91 50.50
```

An AWK program to print the payee and total amount paid would be:

```
BEGIN {
    pay = 0.0
}

{
    if ( holder == $1 )
        pay = pay + $3
    else
    {
        if ( holder != "" ) print "TOTAL FOR", holder, pay
        holder = $1
        pay = $3
    }
}
```



```

    }
END {
    print "TOTAL FOR", holder, pay
}

```

With the above AWK program, we get the following output:

```

TOTAL FOR John 350
TOTAL FOR Mary 151.5

```

When the value in the variable “holder” changes, the running total is output and reset. The “if” statement preceding the “print” statement addresses the fact that “holder” is initially NULL.

Arrays

A truly useful programming language would not be complete without the ability to process arrays. AWK provides arrays, but with the catch that the subscripts of arrays are strings. The following AWK program uses the power of arrays to solve the above payroll problem:

```

{
    totals[$1] = totals[$1] + $3
}
END {
    for ( name in totals ) print "TOTAL
                                FOR", name, totals[name]
}

```

Now the input file does not have to be sorted. Be forewarned that AWK will need to grab enough memory to hold your data, so large datasets will need more memory to complete. Also, because subscripts are strings, multi-dimensional arrays are really one-dimensional arrays with subscripts that are concatenations of the subscript pair. If you wish to use multi-dimensional arrays, I suggest you consult one of the AWK resources mentioned at the end of this article.

Built-In Functions

To complete the idea of AWK being a programming language, let's look at the host of useful built-in functions it supports. This is an area where you will see the greatest difference between AWK and NAWK. *Table 4* is a list of functions supported by NAWK. Some examples of their use follow:

TABLE 4 Built-In Functions

cos(x)	returns the cosine of x (x in radians)
exp(x)	exponential (exp(1) returns natural base e)
int(x)	integer part of x
log(x)	natural logarithm of x
rand()	random number (0 ≤ r < 1)
sin(x)	sine of x (x in radians)
sqrt(x)	returns square root of x
gsub(r,s,t)	substitute s for r globally in string t (if t is omitted, it works over \$0)
index(s,t)	return first position of t in s (returns 0 if not present)
length(s)	returns the length of string s
split(s,a,fs)	split s into array a on field separator fs; returns the the number of fields (if fs is omitted, uses FS)
sub(r,s,t)	substitute s for the leftmost longest substring of t matched by r; returns the number of substitutions made (works on \$0 if t is omitted)
substr(s,p,n)	return substring of s of length n starting at p (returns to end of s if n is omitted)

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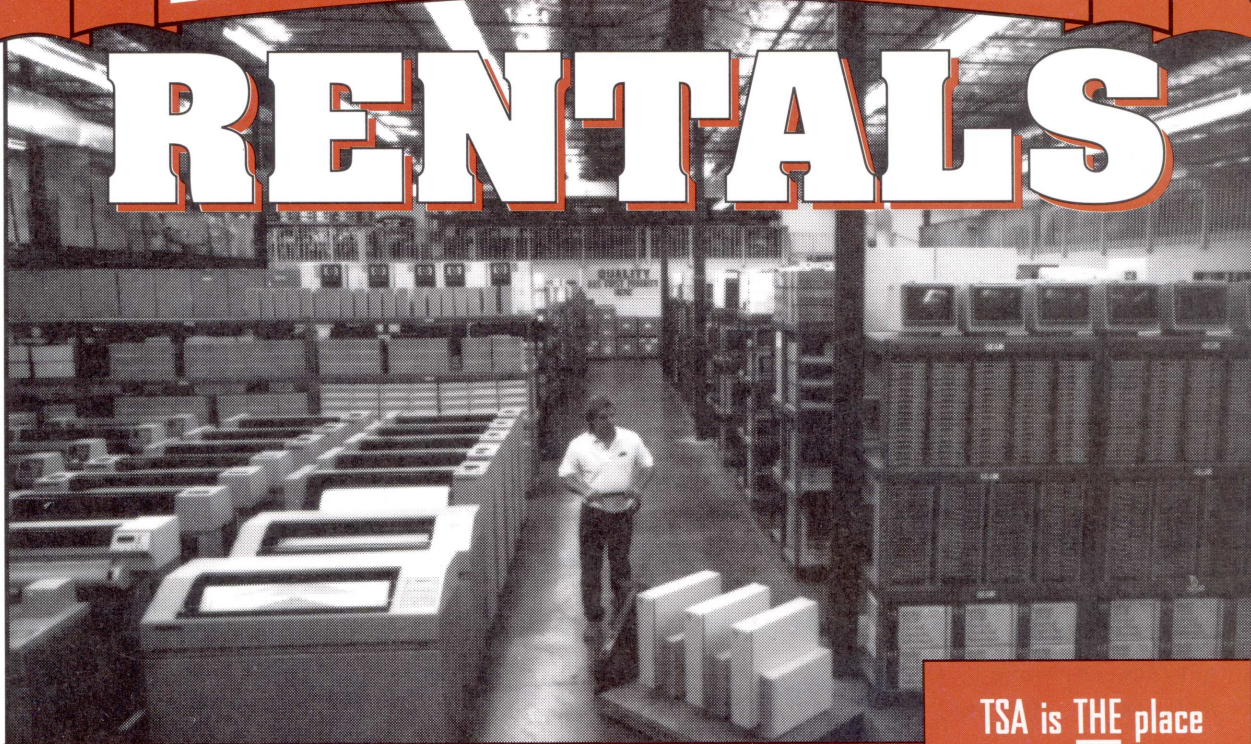
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CIRCLE 69 ON READER SERVICE CARD

<code>\$1 = substr(\$1,1,3)</code>	- abbreviates \$1 to the first three characters
<code>gsub(/izzi/,"issi","mizzissippi")</code>	- returns 1 and the string was changed to "mississippi"
<code>index("mississippi","issi")</code>	- returns 2

Output

The print and printf commands are very versatile. Both commands can direct their output to a file, to a file for append, and to a command pipe exactly the way standard UNIX commands do. The printf command is similar to the same command in the C language. For example:

format	\$1	printf(fmt,\$1)
%c	100	d
%5d	100	100
%7.2f	100.5	100.50
%s	MySystem	MySystem
%-10s	MySystem	MySystem
%10s	MySystem	MySystem

Command Line Variable Assignments

As mentioned before, AWK will allow you to pass variables to it. Note that AWK seems to expect all variables before any filenames. I learn best through examples (maybe I spent too much time in Missouri, the "Show Me" state). Given the following data files:

```
data0
this
is
a
test

data1
yet
another
test

data2
333
7777777
55555
```

And the AWK program file:

```
param.eg
a == "--"
{
    printf("|%-10s| a=%1s b=%1s c=%1s d=%1s\n",$1,a,b,c,d)
}
a != "--"
{
    printf("|%10s| a=%1s b=%1s c=%1s d=%1s\n",$1,a,b,c,d)
}
```

Run the following command:

```
nawk -f param.eg a=- c=2 d=3 data0 a=k b=y c=x data1 data3
```

Here is what you should see:

```
|this      | a=- b= c=2 d=3
|is        | a=- b= c=2 d=3
|a         | a=- b= c=2 d=3
|test      | a=- b= c=2 d=3
|          | yet| a=k b=y c=x d=3
|          | another| a=k b=y c=x d=3
|          | test| a=k b=y c=x d=3
|          | 333| a=k b=y c=x d=3
|          | 7777777| a=k b=y c=x d=3
|          | 55555| a=k b=y c=x d=3
```

You can also access the arguments passed to AWK through ARGV and ARCG. Again, if you wish to use this advanced facility, I suggest you consult the reference materials mentioned at the end.

User-Defined Functions

A programming language would be incomplete if it didn't allow you to define your own functions. NAWK allows you the convenience. The syntax is:

```
function name (parameters) {
    action
    .
    .
    .
}
```


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The parameters you define are passed by value; changing a parameter in the function will not change it for the entire program. An exception to this is array elements you may pass; they are passed by reference and any changes in the function will change the array for the entire program. Variables changed within a function that are not explicitly passed by reference will be changed throughout the program. Here is an example using functions to convert dates from yymmdd to ddmmyy:

```
$ echo "991231" | nawk '
{
print convert($1)
}

function convert (cvtstr) {
return substr($1,3) substr($1,1,2)
}
'
$ 123199
```

Note that the function may be defined first or last; NAWK does not care. Also note that this example is presented as if it were running from a system prompt. You can use AWK and NAWK in this form inside your shell scripts to keep all of the code together.

Stand-Alone AWK Programs

If you write a handy, general-purpose AWK program that you find yourself using in a large number of your shell scripts or frequently by itself, you might want to use the courtesy loader. When the kernel loads an executable program, it checks the first two characters to see if they match "#!". If they do, it calls the program listed afterward and passes the file as input to the program. This eliminates a lot of overhead and insulates users from knowing that your "program" is actually an AWK program.

For an example, I have taken the very first awk program we used (the one that strips the date information from a long file listing) and put it into a file named *filedates*. I have made the file world executable. Here are the contents of *filedates*:

```
#!/usr/bin/awk -f
{
print $6,$7,$8
}
```

Now you can run the command

```
ls -l | filedates
```

Multiple-Line Records

AWK will also help you deal with data that is arranged in multiple-line records, and records of varying numbers of lines, at that. If the records are separated by a blank line, set RS to null (RS=""). When you output these records, you might want the output record separator to be two carriage returns (ORS="\n\n"). You can even make the individual lines a separate field by setting the field separator to a carriage return (FS="\n").

Here is the data file for our example:

```
mldata
Hewlett-Packard
Eastern Sales Region
West 120 Century Road
Paramus, NJ 07653

Hewlett-Packard Company
3000 Hanover Street
Palo Alto, CA 94304

Hewlett-Packard Company
Software Replication Distribution Operation
690 E. Middlefield Avenue
Mountain View, CA 94043
```

Let's run the following program on that data:

```
ml.awk
BEGIN {
    RS=""
}

{
    print NR,":",NF
}
```

This program prints the record number and the number of fields in the record:

```
awk -f ml.awk mldata
1 : 11
2 : 9
3 : 14
```


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awk programming

As you see, this separates each multi-line record into fields on the words. Here is a program that will separate the data into multi-line records by line:

```
ml.awk
BEGIN {
    RS=""
    FS="\n"
}

{
    print NR,":",NF
}
```

Here is the output with the above data:

```
awk -f ml.awk mldata
1 : 4
2 : 3
3 : 4
```

Note that the only change I made was to tell AWK that the field separator was a new line (FS="\n"). This configuration allows for multi-line variable-length records because NR is

counting the lines. With the split function, you can select a line to pull apart on any field separator you like.

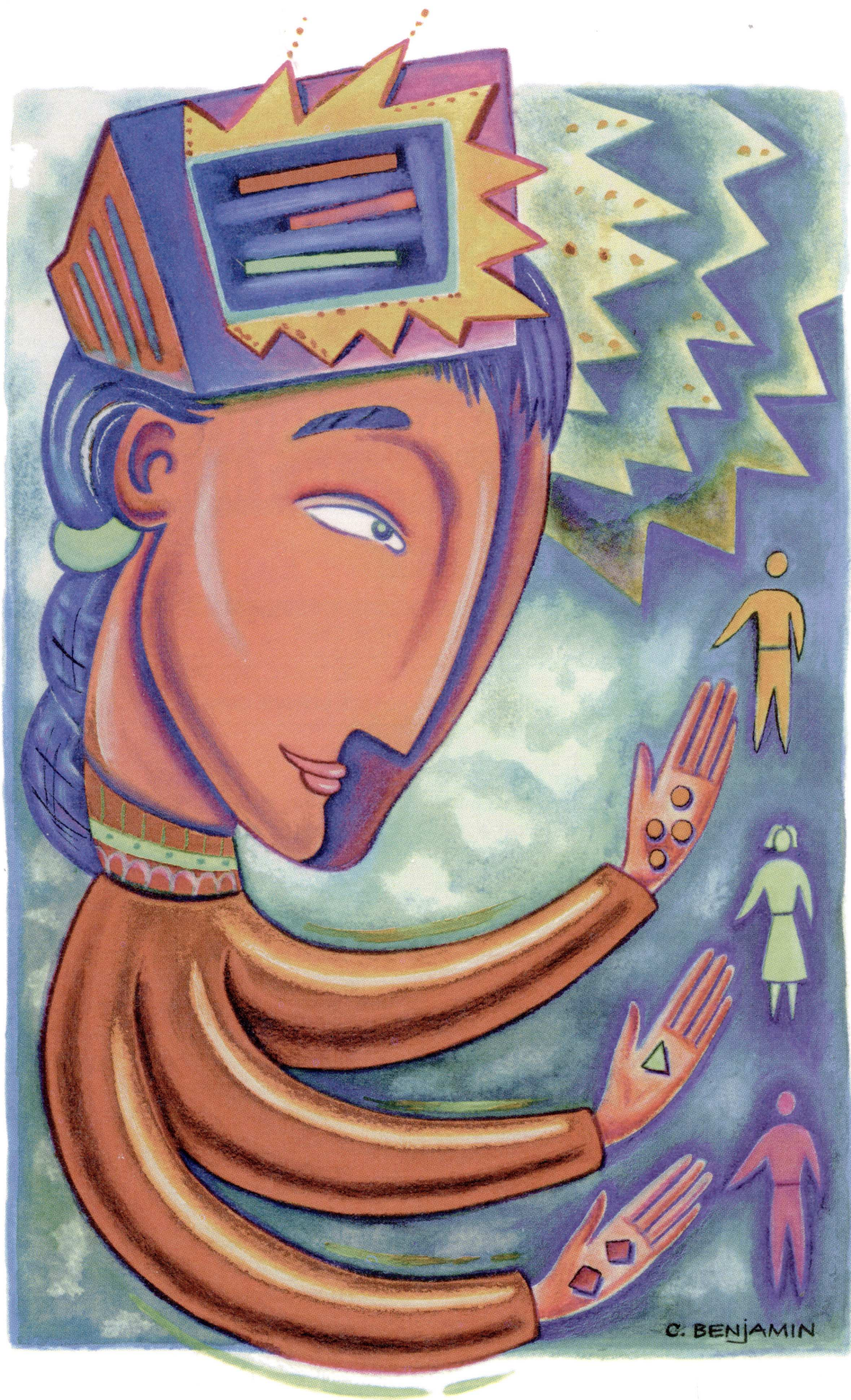
Conclusion

This article will not make you an AWK expert. I have only scratched the surface of AWK and its capabilities. I hope I have provided enough information to get you to begin using AWK in your daily routine (and possibly to investigate more on your own). If you do not integrate it into your day-to-day activities, I hope you will keep AWK in mind for future data conversions you might be involved in. For those who want to go further, I recommend obtaining:

The AWK Programming Language by Aho, Kernighan, and Weinberger, Addison-Wesley Publishing, 1988

sed & awk by Dale Dougherty, O'Reilly & Associates, Inc., 1991

After serving several different organizations over the past seven years as a system administrator with various flavors of UNIX, David L. Totsch still enjoys the profession. He also enjoys discussing UNIX with just about anyone. At present, he is working with HP-UX systems and wide-area networks for a Fortune 100 company in the Piedmont area of North Carolina.



More or Less: Allowing Users Additional Capability or Restricting Them

By default in UNIX, there are two classes of users, the superuser (root) and everyone else. (I use both meanings of *root*—root as superuser and the root directory / .) Root has unlimited privileges and everyone else has equal capability depending on the permissions of files and programs. However, this situation is not ideal in all circumstances. Some administrators wish to give users more or less capability on the system. The administrator may wish to limit users to a subset of normal capabilities for security reasons or because the user is untrained in normal UNIX features. On the other hand, the administrator may wish to allow a user a subset of administrator commands to avoid having to be bothered with minor issues or to avoid having to be available 24 hours a day.

I have tried to list some of the more common methods of changing capabilities and documenting where they might be useful and what their features, advantages, and disadvantages are. This article will not address the simple method of just changing permissions on files or directories, except for *suid*. I do not recommend changing file permissions on HP-supplied files to restrict their usage or changing owner/group identification. Such changes often result in more problems than they solve. In addition, any administrator who has taken a class on the fundamentals of UNIX should understand how to do this.

by John A. Pezzano

Giving Someone Less

The administrator may wish to prevent users from having a full set of normal commands. There are numerous ways to protect the system from accidental or intentional improper use, but no method is guaranteed secure and the tighter the security, the more customized the system will become and the more difficult to manage it will be.

Trusted Systems

HP-UX can be converted to a “trusted system” using *sam*. Trusted systems can permit the administrator to selectively deny access to or use of files or programs for each individual user. In addition, the administrator can audit users and their actions. Conversion to trusted systems is simple and can be done with the *sam* command. Information on trusted systems is fully documented in the *HP-UX System Security* manual so I will not go into further detail.

The advantages of converting to trusted systems is security. Each program and file can have privileges based upon individual login names. The administrator can customize the features of what the user can do and also track what the user attempts, even to the level of certain system calls. There is support and documentation for trusted systems. A trusted system is also much more secure than some of the other methods described below.

There are numerous disadvantages to using trusted systems. Administration can take a lot of effort and in fact can be a nightmare. There is no way to “untrust” the system once it is converted. A trusted system is overkill in many circumstances, particularly if the intention is to limit one or a small number of users without hurting others. A trusted system cannot be updated—reinstallation is necessary to update to new revisions.

An additional HP-UX product for HP Business Server systems that provides a much higher level of security than standard HP-UX can be purchased separately. Because of its complexity, the need to purchase it instead of the HP-UX product, and its usefulness primarily to governments and defense contractors, I will refrain from discussing it here.

Access Control Lists

As part of trusted systems, Access Control Lists (ACLs) provide a powerful means of limiting access to individual programs or files. ACLs can be used separately outside of trusted systems. Each file can be provided with an ACL that specifies individual users who may receive more or less permission than that specified by ordinary UNIX permissions.

The advantage of ACLs is that for any file or program, an individual user, group, user/group combination, or wild card listing of them can have specific permissions. Users and groups can be specified by name or id number.

The disadvantage of using ACLs is their maintenance. ACLs are not readily obvious and if set, a user (or even the super-user) might not notice they are in effect and therefore become confused when he cannot access a file that ordinary permissions show is accessible. A long listing of a file will show a plus sign (+) after the permissions to show that ACLs are in effect for that file. For example,

```
$ ll file
-rw-rw----+ 1 john mygroup 1246 Jan 18 12:03 file
```

Another disadvantage is that the improper use of other commands such as **chmod** or the ordinary use of others can result in ACLs being silently deleted. Updating systems may change permissions on HP-supplied files and directories. According to the HP-UX manuals, “ACLs are intended for use on ordinary files and directories. Optional ACL entries are not recommended on files that are manipulated by certain system utilities, such as terminal special files and LP scheduler control files. These utilities might delete optional entries, including those whose intent is restrictive, without warning as a consequence of calling *chmod*(2), thereby increasing access unexpectedly.” [*HP-UX Reference acl*(5)]

A further disadvantage of ACLs involves backups. Not all backup utilities will back up or restore ACLs correctly, and they can be silently deleted, resulting in loss of security.

I strongly recommend that before ACLs are used, the administrator read the appropriate sections of *HP-UX System Security* and thoroughly understand ACLs. Furthermore, the administrator should make sure that others who might have to take over problems unexpectedly in his absence know that ACLs are in effect and the consequences of file recovery. They should tell any HP representatives assisting that there are ACLs.

Login chroot

In the */etc/passwd* file, the administrator sets up the user’s name, home directory, and login shell. There is a feature of *login* that is used if the shell is set to an asterisk (*) instead of a normal shell such as */bin/sh*. In this case, *login* will set the home directory listed to be the root directory for that user. This means that there is no way the user can access any file or

hp-ux/usr

Workstation Articles

Interex initiated the publication of *hp-ux/usr* to serve the needs of HP-UX users. It is a forum for sharing information on all HP-UX systems—including workstations, business systems, and networks. The award-winning magazine is now in its second year of publication, and it has met with an enthusiastic response from its readership.

Feature articles in *hp-ux/usr* so far have covered topics relevant to both Series 800 and Series 700 users. Some have been series-specific, some of general interest. The columns treat a wide variety of subjects, from systems administration to the X Window System. The Question and Answer department always contains both a general HP-UX and a workstation section.

InterWorks and Interex now have an alliance in which cooperation and sharing are actively promoted. InterWorks has many experienced Series 700 workstation users and they are encouraged to write for *hp-ux/usr*. The magazine is a user-group publication and as such its underlying premise is the sharing of knowledge. InterWorks members who have the expertise, and a desire to help other users make more effective use of their workstations, are welcome in the pages of *hp-ux/usr*. It is an ideal forum in which to share that knowledge.

The magazine accepts articles on all aspects of HP-UX computing. It is *not* intended solely as a business UNIX publication: workstation articles on technical and scientific subjects are welcome. Authors are paid an honorarium of \$65 a typeset page. Writers who review software or hardware receive a bonus that ranges from \$300 to \$800, depending on the complexity and length of the review. *hp-ux/usr* is bimonthly; the due date for copy is nine weeks before the issue date. If you are interested in writing workstation articles, contact *hp-ux/usr* managing editor Michael Ehrhardt to discuss proposed topics and to request a copy of the Author's Guidelines. Send e-mail to ehrhadt@interex.org or call 408.747.0227.

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program existing above the listed home directory. Thus the system is well protected from the user.

For example, if the */etc/passwd* file entry is:

```
johnp:m1vR6i7.NNT4Y:2979:102::/users/johnp:*
```

then */users/johnp* becomes the */* directory for that user. Thus there must exist a complete structure of device files, programs, and files so that the user can execute whatever is necessary—there must be a */users/johnp/bin/login*, */users/johnp/etc/passwd*, etc. Generally, one can link the real files to provide the needed files and programs (although symbolic links to files or directories above the user's new root directory do not work). It also means that by having a separate *passwd* file, the user can have a different login name and even be root in his own kingdom!

The advantages to changing the root (*/*) level of the user include support (see *login(1)* manual page) and the tightness of security if it is properly set up. The user has absolutely no access to any file above the new root directory.

The disadvantages include the scarcity of documentation on all the quirks involved, the need to create a *complete* structure with files such as shared libraries, terminfo files, etc., and the inability to use symbolic links to the real files. Hard links are required. Unless one is an experienced system administrator, setting up this method is difficult and confusing.

chroot Later

There is a system call to *chroot(2)* that will change the root directory of a user in a way similar to the method described above. The difference is that with this method, the administrator has a program that changes the root (*/*) level of the user after login so there are fewer confusing things to set up. With this method, the login shell would *exec* a program to change the root level and *exec* a new shell.

The advantages of using this technique are the same as for the login *chroot* except for support. In addition, it does not require quite as many files to be set up as the previous method because all the login is done at the normal root level.

The disadvantage is that if you write your own program, you must support it yourself. In addition, the same problems that occur with the login *chroot*, albeit on a smaller scale, are applicable here.

Restricted Shell

If the intention is to limit only one or a few users' access to programs or files, the restricted shell may be what is needed. The restricted shells (*/bin/rsh*, */bin/rksh*) prohibit users from changing their directory, changing their *PATH* variable, specifying path or command names containing */*, and redirecting output. The users can be given access to programs offering more capability than they would otherwise have, which can permit them to execute programs or access files that their limited capability would not otherwise permit.

With a restricted shell, the user's home directory should not have write permission to the user to prevent modification of *.profile* or similar files. No directory to which the user has access to execute commands should have write permission.

The advantages to the restricted shell include the following:

- It is supported by HP.
- It is not difficult to manage once set up.
- It is easy to add or subtract commands that can be executed.
- It provides fairly good security, especially against unsophisticated users.

The disadvantages to the use of the restricted shell are:

- It is not very well documented.
- It is not easy to set up, especially for the unsophisticated administrator.
- It can have security holes, especially when the user is sophisticated and the administrator is not or has made a mistake.

The user cannot be given access to commands such as *vi* or the shells, which permit security breakage. Any programs that allow escaping to the shell (such as *mailx* and *elm*) must be checked to make sure they do not provide a back door to break security.

Script to Limit Commands

The administrator can set up a script (or, for that matter, a program) that limits the commands a user can execute and possibly prompts the user with a menu of options. This method is especially useful for unsophisticated users who need to execute only a very limited number of commands on the system or run certain applications.

The advantages to this method are its simplicity and customizability: the user can be given a menu of options and just has to answer questions. Errors can be handled and the user

does not have to know UNIX.

The disadvantages are that it can be clumsy for large numbers of commands, it must be locally maintained every time changes are required, and it must handle all exceptions, errors, and bad entries from the user to be useful. The script should trap all signals to prevent accidental or intentional attempts to break out.

Bypassing the Login Shell

If the users will execute a single program upon login, it is possible to set them up so that the "shell" is the program. Thus when they exit the program, they are immediately logged out. There is no reason why the login shell specified in `/etc/passwd` has to be an HP-supplied shell program and any user program can be a "shell."

The advantage of this method is that the users never even see UNIX and immediately enter their program. It will also be quite fast, bypassing the interpretive shell login file. In addition, the program prevents users from breaking out to a shell, as none exists.

The disadvantage is that environment variables set up by the shell must be set up by the program. Since such variables are minimal, an alternative is to use a login shell with a minimal startup file which then does an `exec program` on the program to be executed, which will then replace the shell with the program. Thus when the users log in, the shell quickly is replaced by the more secure program and when they exit the program, they are logged out.

Allowing More Capability

The administrator may wish to give one or more individual users the ability to execute a command normally

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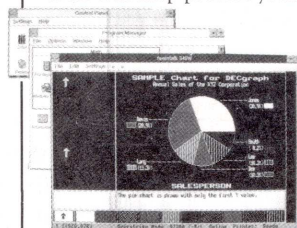
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reserved for the administrator, such as the ability to mount removable disks, back up the system, or add new users. In general, this needs to be done with much care. Unlike limiting users, the danger in giving users more capability is not that they have as much capability as anyone else, but that they have as much capability as root. It is important that with all these methods the one used provide security against attempts to break it or attempts to use it for more than was intended by the administrator.

All the methods take advantage of the concept of *suid*. This means that when a program executes, it runs not with the capability of the user of the program but with that of the owner. Thus if root owns a program set up as *suid* root, the program has the capabilities of root. Examples of such programs include */bin/passwd*, which allows the user to modify his or her password in */etc/passwd* although the user has no permission to modify it with normal commands such as *vi*.

In addition to or instead of *suid*, a program could have *sgid*, which would set the group permissions of the program to those of the owner rather than those of the user. To set *suid* on a program, use the *chmod* command with *chmod o+s file*. To set group id, do *chmod g+s file*.

Security on any *suid* program should ensure that it does not have write permission, because a common method of attempting to break systems is to look for writeable *suid* programs and overlay them with a program that does something entirely different but now retains the permissions of the original program.

Suid on Program

Setting the *suid* bit on an individual program enables it to be run by other users. This is useful for individual programs but not very effective if large numbers of programs need to be set up this way.

The advantage of *suid* on a program is that it is quick and simple.

One disadvantage is that it is unsupported if any HP-supplied program has its permissions changed, unless such change is documented by HP (as in */usr/lib/sendmail*). The permissions of any HP-supplied file might be reset by an update of the software. In addition, few programs not originally designed for *suid* contain enough self-protection to prevent the user from doing what was not intended. For example, doing an *suid* on */etc/mount* to allow the user to mount removable disks

also permits mounting non-removable ones. In addition, a removable disk can be mounted to another system and an *suid* version of *vi* can be placed on it. Then when it is mounted on the target system, the user has a way to break all security. Using *suid* on a program not specifically designed for it is a serious security hazard.

Suid Script

An alternative method of doing *suid* on a program is to allow a user to execute a script file that is *suid*. The script file can check for proper use, pass only selected parameters to the executable program, and provide some security and password protection. It can also cause attempts to use it to be logged.

The *suid* script *must* have as its first line

```
#!/bin/sh
```

(or other appropriate shell to execute command).

This line beginning in column 1 must start with the *#!*, which provides a magic number. The presence of the line does not alone make it *suid* and many non-*suid* shell scripts contain this line. It must also have the *suid* bit set and must be readable by anyone who executes it. The target program would not have the *suid* bit set. Here is an *suid* script to do an *lpshut*, then an *lpsched*:

```
#!/bin/ksh
# script to stop and start spooler
/usr/lib/lpshut
/usr/lib/lpsched
```

Note that this script would allow any user with execute permissions on it to shut down and automatically restart the spooler. The program specifies the full paths to the programs for security reasons and does not allow any options.

The advantage of an *suid* script is simplicity, combined with the ability to check passed parameters (or disallow them) to make sure that the program being executed is run by others as the owner wishes it to be run.

The disadvantage is that since it is readable and since shell scripts are ASCII text, the user can look at the script and possibly see methods to break it.

Suid Firewall Program

An *suid* firewall program is a simple *suid* program that

executes only the actual program or programs and protects the real programs by providing a security firewall to prevent misuse. Like the suid script, it can check passed parameters (or disallow them) to make sure the program being executed is run by others as the owner wishes it to be run.

The suid program must have the suid bit set. It is not necessary then to set the suid bit on the target program.

The advantage of the suid firewall program is that it is not readable, as it is executable text, and therefore is much more difficult to break. It does not require modifying permissions on HP-supplied programs and so it does not "change" anything in the system.

The disadvantage is that the administrator must write, maintain, and document a program. For the non-programming administrator, this can be a problem.

Here is an example of a simple suid program that will do an *lpshut*, then an *lpsched*:

```
main()
{
    if(setuid(0) < 0) {
        perror("setuid");
        exit(1);
    }
    system("/usr/lib/lpshut");
    system("/usr/lib/lpsched");
}
```

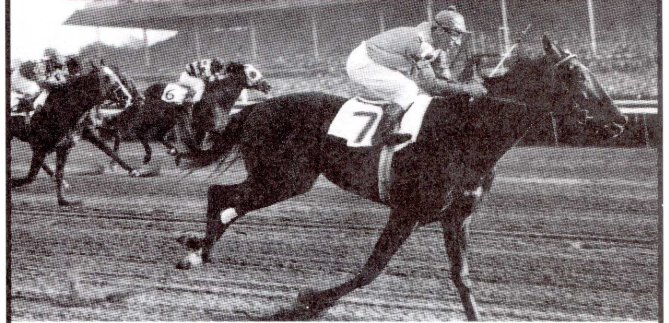
Like the script example, it executes only what the author intended. Note, however, that it prevents the user from seeing exactly what it is doing because he does not see the source. Even though this particular example doesn't record anything, nobody knows whether it is noting who executes it.

Conclusion

There are numerous ways to deny normal capability or add special capabilities to a user. None is perfect or useful in all circumstances. The administrator must choose wisely, and in the case of allowing special privileges, must do so carefully if security is to be maintained. However, one of the features of UNIX is that it is so customizable and flexible, and this allows the administrator the ability to customize the system and do it in many ways.

It is very important if such customization is done that it be

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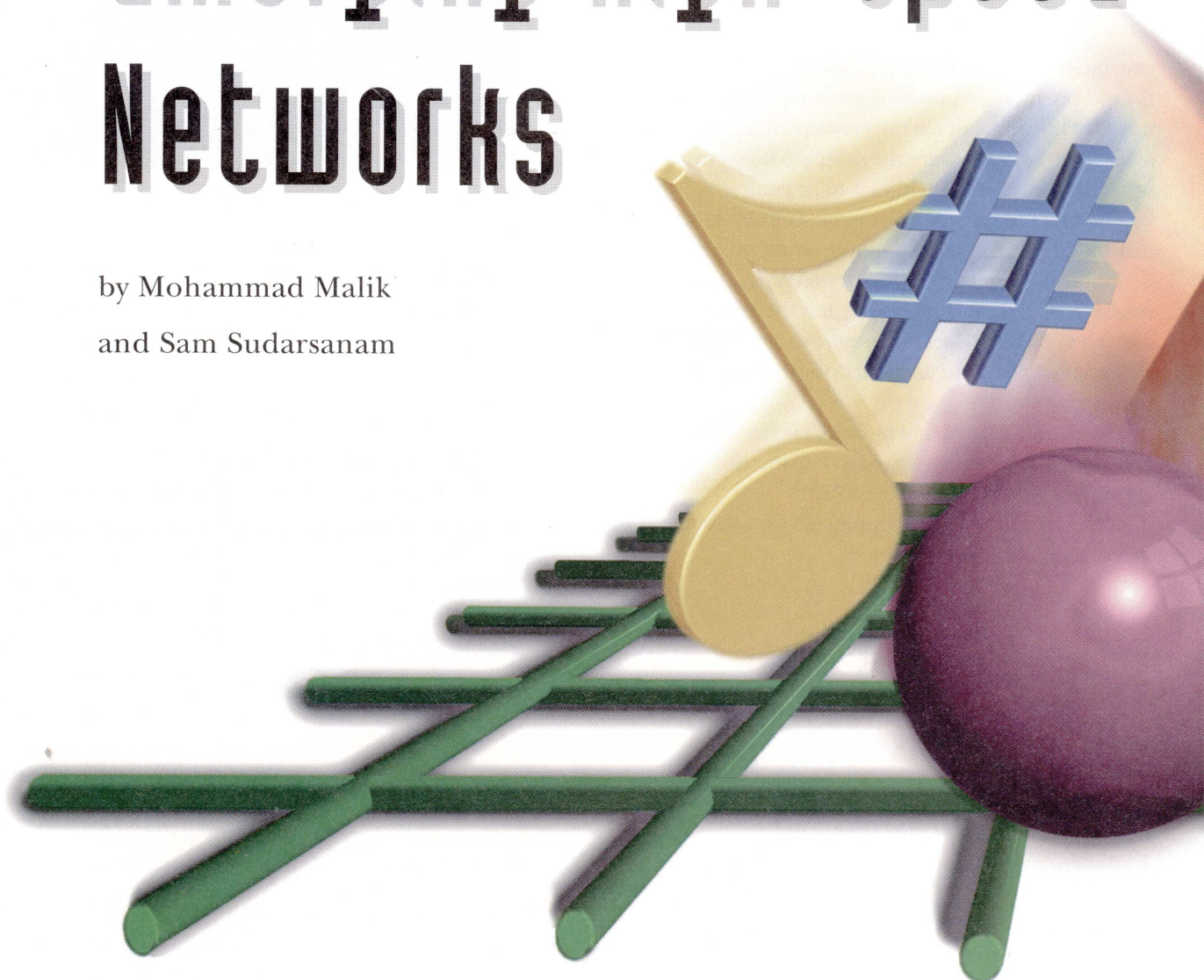
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fully documented so that if the regular administrator is absent or is no longer in charge, the replacement understands the customization has been done, what it does, how to maintain it, and how to explain it to others, such as HP representatives who may be called for help. ■

John A. Pezzano is an HP Response Center engineer in Atlanta, Georgia. Before moving to Atlanta, he spent seven years in the HP office in El Paso, Texas, supporting HP-UX systems.

Emerging High-Speed Networks

by Mohammad Malik
and Sam Sudarsanam



Throughout the world, organizations are seeking innovative ways to utilize information technology for competitive advantage and improved productivity.

Business needs are evolving rapidly because of significant changes in business trends and processes in the commercial, technical, and manufacturing areas, such as sales and distribution, order fulfillment, customer support, product generation, and R&D. Likewise, Information Technology is also undergoing changes that include:

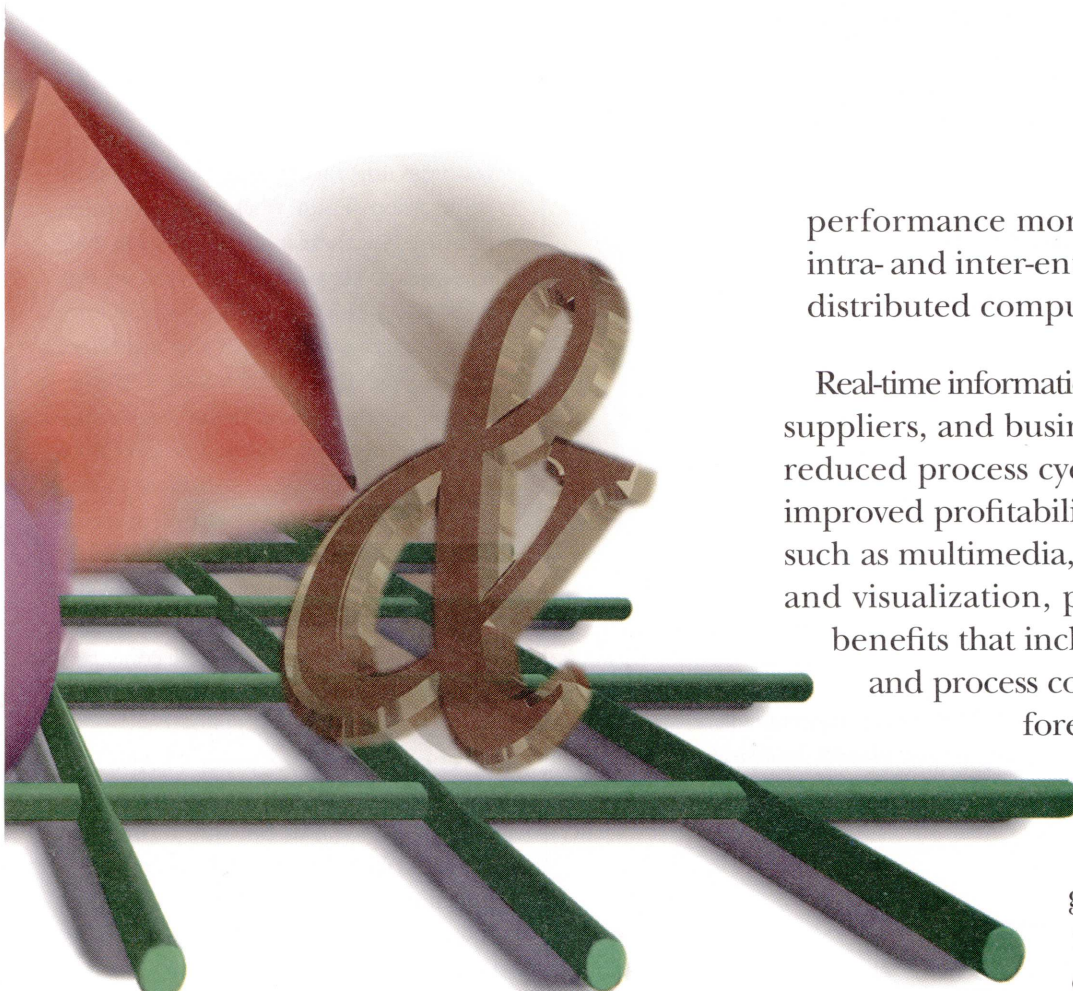


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- the migration of applications to the client-server paradigm
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- the growing population of powerful networked computers
- the need for real-time, secure inter-enterprise communication and information exchange
- the need for information integration,

performance monitoring, and reporting of intra- and inter-enterprise networks of open, distributed computing environments.

Real-time information exchange with customers, suppliers, and business partners will result in reduced process cycle times, lower costs, and improved profitability. Emerging applications, such as multimedia, collaboration, simulation, and visualization, promise to deliver several benefits that include a reduction in project and process completion times and, therefore, improved time-to-market and enhanced employee productivity.

A complex, evolving global economy is creating interdependencies among different countries and organizations. With this comes the need for timely, accurate transfer of high-quality multimedia information (implying information age capabilities for everyone). Application users will require information access and communication capabilities in any combination of media—voice, data, image—anytime, anywhere, with convenience and economy.

The convergence of high-speed networks and distributed computing will provide a powerful new information utility for achieving global efficiency and local responsiveness.

FIGURE 1 An existing LAN topology based on shared media hubs, bridges, and routers.

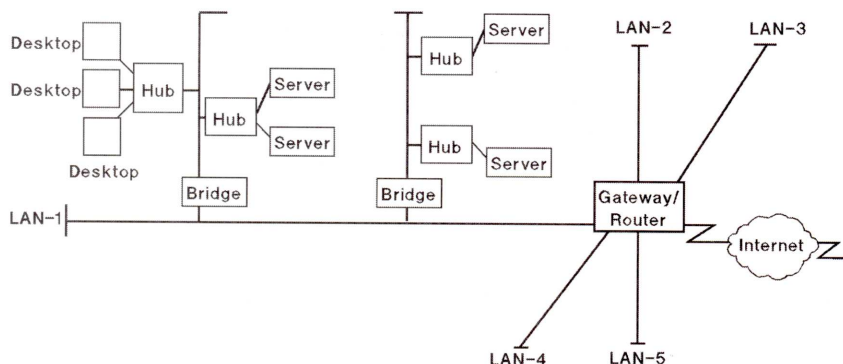
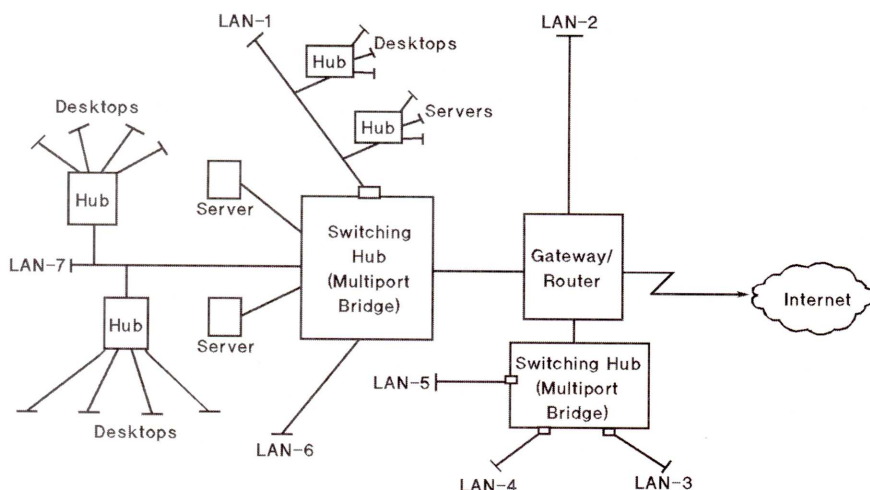


FIGURE 2 As numbers and speeds of attached LAN devices increase, switching hubs offer an interim solution to bandwidth bottlenecks.



Limitations of Current Networks

Over the past several years, the role of Local Area Networks (LANs) has changed considerably. For example, many corporations are organizing people into work groups by project or business unit rather than by geographical location. These work groups require control over their own resources as well as access to corporate resources on the network. The growth in numbers and the increasing speed of the attached computing devices are taxing LANs to the point that networks are beginning to run out of bandwidth. The problem is expected to become more acute as distributed computing and multimedia applications are implemented.

Today's architecture, built on hubs, bridges, and routers incorporating distributed or collapsed backbone concepts, have not been able to provide the needed flexibility. See *Figure 1*.

The limitation of today's LANs has introduced performance and congestion problems that become more pronounced with shared media access. The popular solutions of segmenting and resegmenting LANs have not completely resolved the bandwidth issues.

A long-term innovative architectural solution is needed to address the LAN bandwidth problem. A lot of work is being done in the development of 100VG-AnyLAN, Asynchronous Transfer Mode (ATM), and Fibre Channel switching fabrics to address these issues.

The real challenge facing network managers today is to develop a cost-effective migration path that will fulfill the short-term requirements and lead them toward building the ATM infrastructure. The following sections will discuss the switching hub, 100BaseVG and 100VG-AnyLAN, and ATM technologies and

New HP-UX Software Library Edition Released by Interex

The 1994 HP-UX Contributed Software Library (CSL) will be available on June 1. The new release contains utilities and applications created by experienced users to target the specific challenges facing HP-UX installations. The release contains 48 programs, some of which come directly from Hewlett-Packard Labs. This year's release is one of the most extensive software library collections available today configured specifically for users of HP-UX.

According to Paul Gerwitz, CSL/HP-UX Committee Chairman:

"We have attempted to anticipate our members' needs through some of the contributions in this year's release, while providing new functionality, especially in integrating to non-HP-UX environments. We are grateful to the many Interex members and other interested organizations whose hard work contributed to this release."

Many exceptional systems administration programs were also contributed. These include:

- 'top'
- 'psort'
- 'traceroute'
- 'sudo'
- current versions of 'perl' and 'imake'

New utilities include:

- the Free Software Foundation's C compiler 'gcc' and libraries
- a movie viewer to display sequenced graphics

All submissions are evaluated by the CSL/HP-UX Quality Assurance Team for technical quality and accuracy, ensuring that the CSL release contains only the highest caliber programs.

This edition of the library is available in preferred software formats: 1600 or 6250 bpi magnetic tape, Linus cartridge tape (CS-80), Digital Audio Tape 4mm (DAT), and magneto-optical disk, which allows users to store large amounts of software online.

HP-UX users who subscribe to CSL Site-level membership in Interex pay an annual fee of \$495 and automatically receive the annual HP-UX CSL release in addition to conference discounts, HP-UX-specific publications, access to Special Interest Groups (SIGs), and the benefits of an extensive advocacy program. An index of the entire HP-UX CSL Library is available from the Member Services Department. Phone 800.INTEREX, fax us at 408.747.0947, or send an e-mail message to csl@interex.org.

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briefly describe Fibre Channel and Photonics.

Switching Hubs

Conceptually, switching hubs represent the first step towards migration from shared media access to switched LANs (see Figure 2). A switching hub is more like a multiport bridge than a multiport repeater, with routing protocol support. It uses an intelligent filtering mechanism to forward traffic only to those ports that need to hear it. This is essentially done at the media speed, that is, they are just as fast as the cabling media to which they are connected. This combination of multiport switching (filtering) and media speed moves us from shared to switched LANs. In a shared LAN, all ports on the hub compete for the same 10 Megabits per second (Mbps) bandwidth. In a switched LAN, each port or a combination of ports on the hub may be configured to see the equivalent of a dedicated 10 Mbps.

The switching hubs extend the life of existing 10 Mbps Ethernet networks. They will provide network managers with enough breathing space until 100+ Mbps technologies (100 Mbps Ethernet, 100BaseVG, ATM LAN, and Fibre Channel LAN) become available. These hubs also provide the flexibility of network reconfiguration. For example, critical servers can be assigned dedicated per port bandwidth (see Figure 3). Work group networks may be configured for reduced congestion or broadcast problems. Diskless clients and X-Terminals are sensitive to network performance. Switching hubs provide options to avoid these problems. They can be configured to be less susceptible to network performance degradation caused by variables such as delay and traffic levels. In

FIGURE 3 Multiple switching hubs incorporated in a LAN infrastructure can be configured to provide dedicated per port bandwidth for critical systems and applications.

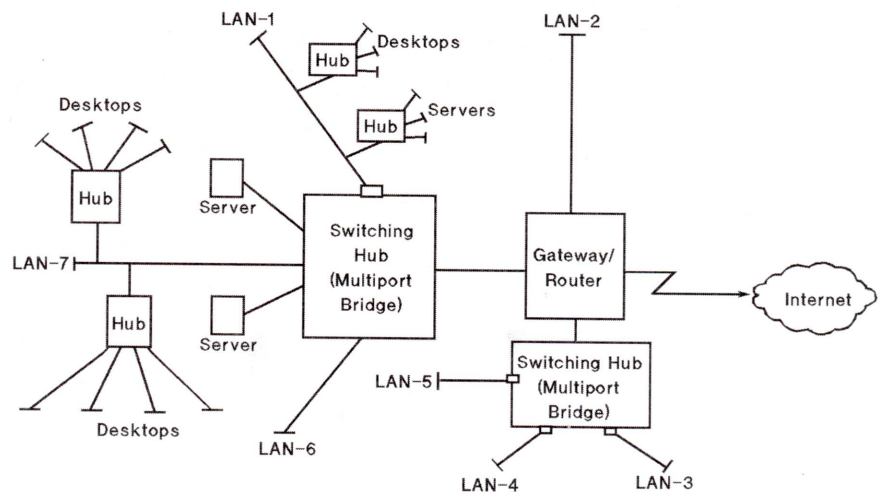
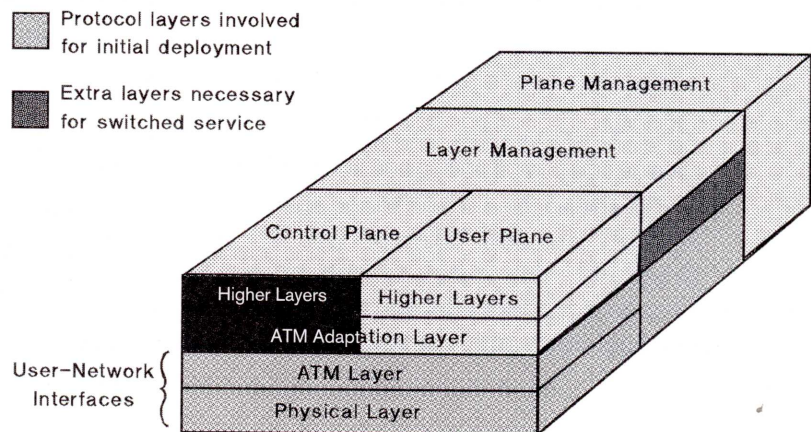
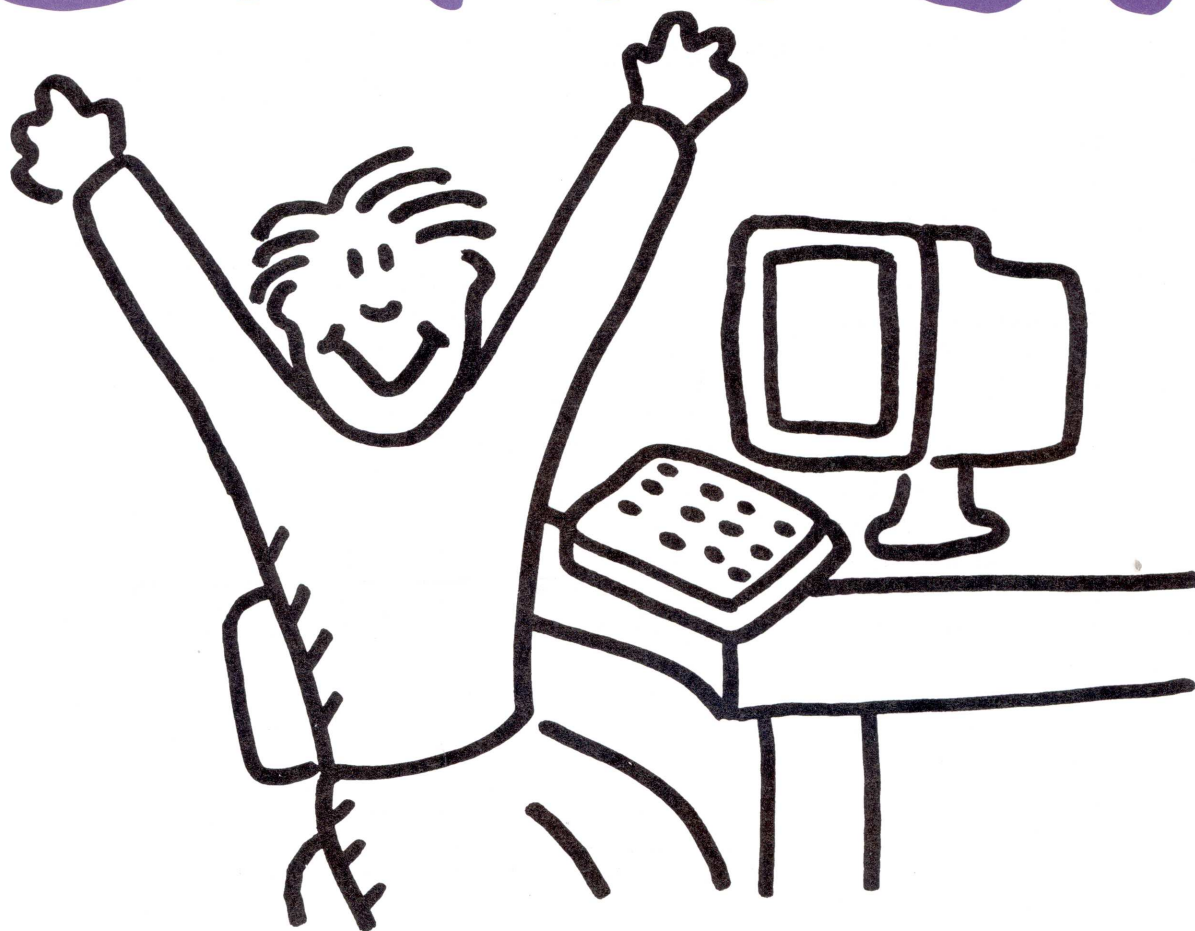


FIGURE 4 ATM Layered Architecture Model.



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FIGURE 5 *ATM switch can be integrated into existing infrastructure to support critical LAN segments.*

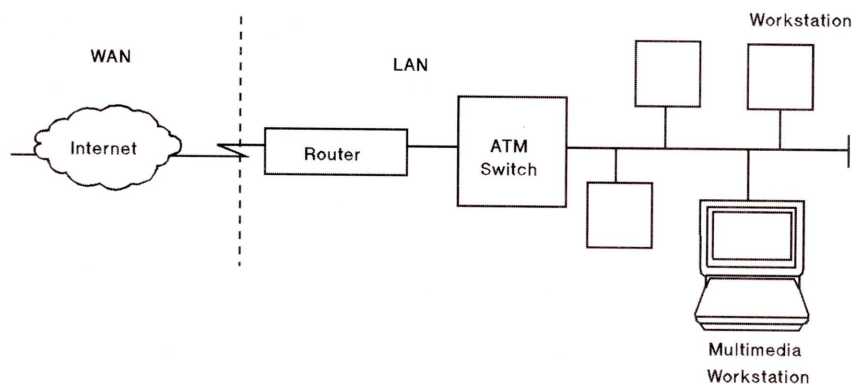
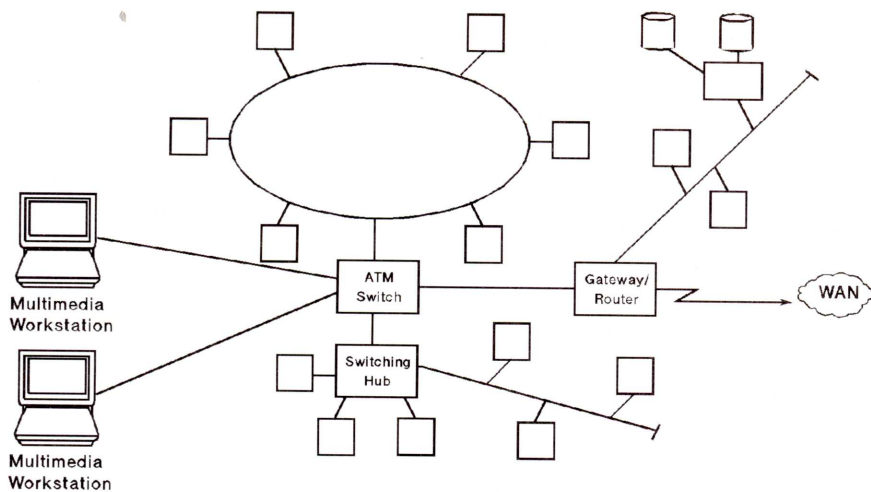


FIGURE 6 *ATM will support emerging multimedia applications and provide interoperability with legacy networks such as Ethernet, Token Ring, and FDDI.*



the long run, hub manufacturers will upgrade the technology to incorporate cell switching fabrics for multimedia applications and multipurpose communication supporting multivendor protocols.

100BaseVG and 100VG-AnyLAN

100BaseVG is a LAN standard proposed by HP and AT&T. It will provide 100 Mbps data transmission over voice-grade Unshielded Twisted Pair (UTP)

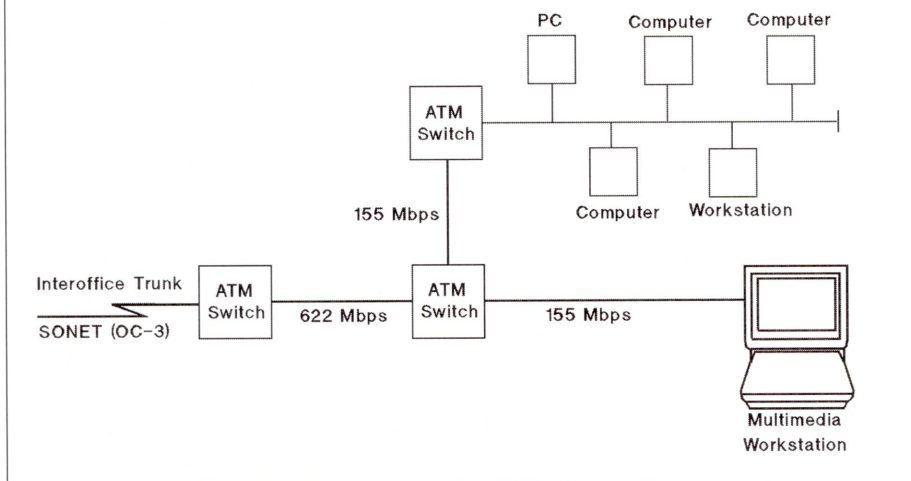
cabling—the most commonly installed cable plant for 10BaseT Ethernet networks. Because 100BaseVG operates on any grade UTP, from Category 3 to Category 5, most users will not have to install any new cabling to take advantage of this technology. Since 100BaseVG can easily coexist with 10BaseT, organizations will be able to upgrade seamlessly as user needs dictate.

Two technologies, Quartet Signaling and the Demand Priority access method, are the fundamental components of 100BaseVG. Quartet Signaling uses all four pairs to transmit data simultaneously, while utilizing essentially the same frequencies as 10BaseT. It also uses a more efficient encoding scheme, called 5B/6B Non-Return-to-Zero (NRZ), to transmit twice as many bits per cycle on each pair as 10BaseT, which uses Manchester coding.

The Demand Priority access method is a simplification of the Carrier-Sense Multiple Access with Collision Detection (CSMA-CD) scheme used in earlier 10 Mbps Ethernet networks. By eliminating packet collisions, Demand Priority simplifies network operation and eliminates the overhead of packet collisions and recovery. In doing so, it substantially increases usable network throughput and significantly improves network characteristics such as latency, enabling support for time-sensitive applications, that is, multimedia. Demand Priority takes advantage of the star topology by using simple intelligence in the hub to arbitrate requests to transmit packets, avoiding collisions and significantly improving network control. It provides two levels of priority, the normal and high priority.

Migrating to 100BaseVG from 10BaseT is a simple two-step process. The network administrator first identifies

FIGURE 7 Eventual vision of an end-to-end ATM and SONET network that would also integrate legacy networks and systems.



clients and servers to be upgraded and then replaces the 10BaseT adapter in each workstation with a 10/100 adapter (one that can operate at 10 Mbps when connected to a 10BaseT hub and 100 Mbps when connected to a 100BaseVG port). No new cabling needs to be installed. The same RJ-45 connector and cabling used for the 10BaseT network can be used when operating at 100 Mbps with 100BaseVG.

The second step is to install a new 100BaseVG hub module in the wiring closet, in parallel with the existing 10BaseT module. Individual workstations can be migrated from the 10BaseT subnet to the new 100BaseVG subnet by simply disconnecting each station's RJ-45 jack from the 10BaseT hub port, and reconnecting it to the 100BaseVG hub port.

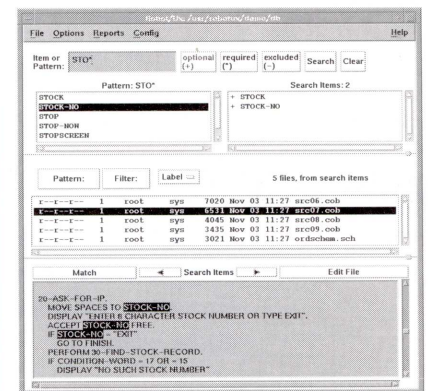
Announced by Hewlett-Packard and IBM, 100VG-AnyLAN is an extension of HP and AT&T's 100Base-VG technology endorsed by IEEE as the foundation for a new 802.12 standard. 100VG-AnyLAN

combines the best of existing Ethernet and Token Ring standards for transmitting Ethernet and Token Ring frame information at 100 Mbits/s. It will operate over category 3, 4, or 5 unshielded twisted pair (UTP), shielded twisted pair (STP), and optical fiber. By supporting all the network design rules and topologies of 10Base-T as well as Token Ring networks, 100VG-AnyLAN will enable organizations to leverage their existing networks and cable infrastructures while upgrading to higher transmission speeds. In addition, 100VG-AnyLAN will provide guaranteed bandwidth for emerging time-sensitive applications such as multimedia.

Asynchronous Transfer Mode (ATM)

The ATM is an evolving Broadband Integrated Services Digital Network (B-ISDN) standard that allows dynamic integration and multiplexing of voice, video, and data services on Synchronous Optical Network (SONET) links operating at speeds of 150 Mbps or higher. Although

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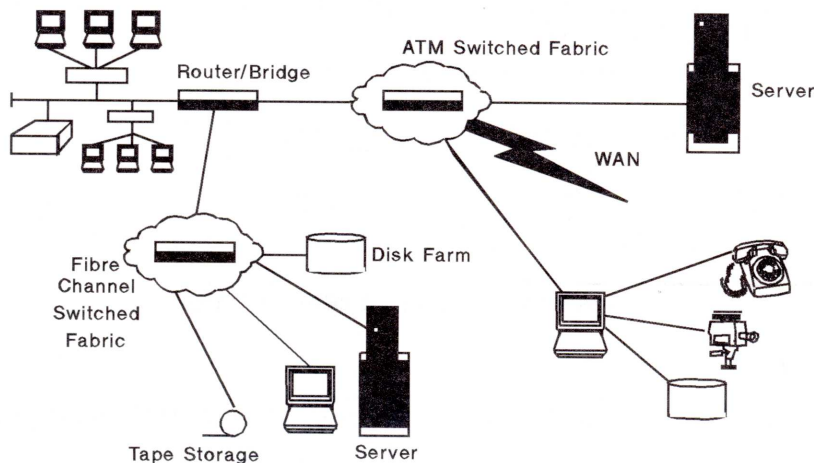
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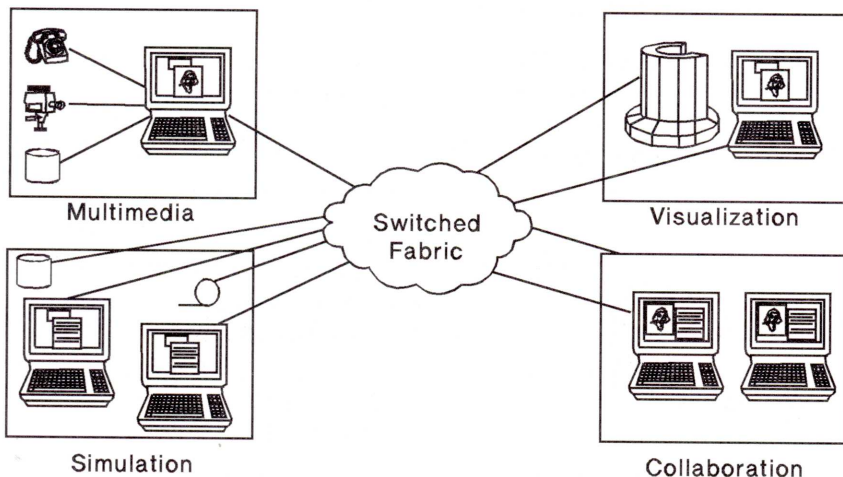
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FIGURE 8

An integrated hybrid network of Fibre Channel and ATM switching fabrics interconnected via bridge/router. ATM provides multimedia communications support and LAN to WAN integration. Fibre Channel provides mass storage integration and high-end work-group cluster support.

**FIGURE 9**

Switched Fabrics that will provide enterprise-wide integration of high-performance systems. This will enable efficient implementation of emerging applications such as client-server, imaging, collaboration, simulation, and multimedia.



it was originally envisioned as a wide area technology, ATM has also gained acceptance as a local area network technology. For users who do not require very high transmission speeds, vendor initiatives are coming from several directions to make ATM products and services available at lower speeds. Several product vendors have presented the ATM Forum with proposals for low-speed ATM for local area networks. For example, AT&T and Hewlett-Packard Company have jointly presented a 51 Mbps proposal. ATM will support complex multivendor applications, bringing switched dedicated bandwidth directly to the desktop over existing UTP or fiber-optic cabling at rates from 51 Mbps to several Gbps.

ATM allows dynamic bandwidth allocation on demand. It uses fixed length cells and is referred to as cell relay. The fixed length, 53-byte ATM cell consists of 5-byte header and 48-byte information field (payload). An ATM network routes traffic by encapsulating 48-byte information payloads of fixed-size cells and switching these cells through very fast packet switches.

As illustrated in Figure 4, the ATM protocol operates over a physical layer. The protocols immediately above the ATM layer are used to adopt various services. The control plane with its layered structure provides signaling and connection control functions. The user plane transfers application information, whereas the management plane provides maintenance, operation, and other management functions.

How Does ATM Fit in Existing Networks?

In the long run, the eventual vision calls for a homogeneous end-to-end, cell-based infrastructure (Figure 7). However,

cell switching would initially be implemented in the backbone and high-performance work groups without completely replacing existing networks. Current protocols and applications, as well as wiring plants, can remain unchanged. ATM switches can be selectively deployed where they solve acute problems, thereby protecting investments in existing network components such as shared bandwidth hubs, routers, bridges, and switching hubs. Heavily utilized resources such as high-end application servers can be provided direct ATM connections.

In short, the local ATM can be deployed for the following reasons:

- As a backbone ATM for connecting hubs, routers, and bridges
- As a work-group ATM for distributed client-server computing, deploying high-end servers and workstations
- For wide area ATM network connectivity

One of the more important attractions of ATM technology is its scalability and growth path. It can utilize any combination of speeds, from DS-3 (45 Mbps) to SONET OC-48 (2.5 Gbps), over a variety of media such as twisted pair and fiber optics. See *Figures 5, 6, and 7* for examples of ATM.

Fibre Channel

The Fibre Channel standard is being defined by the American National Standards Institute (ANSI). Some industry experts believe that the channel-attached architecture usually associated with host-peripheral connections could emerge as a viable alternative to today's high-end LAN architecture. Recently it has found support among computer manufacturers such as Hewlett-Packard, IBM,

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and Sun Microsystems. Fibre Channel provides three types of connections: point-to-point I/O (for example, mass data storage); clusters of high-end workstations; and high-speed switched LAN connections. It offers a better solution for high-performance data transfer of very large files.

Fibre Channel offers highly scalable data rates of 266 Mbps to multi-Gbps over coax media for short distances and fiber optics for distances up to 10 km. Since it uses variable length frame, the Fibre Channel offers the lowest latency and is better suited for maximum data rate transfers.

Fibre Channel specifications define an encapsulation technique to handle both LAN and high-performance channel protocols. Fibre Channel supported interfaces include High Performance Parallel Interface (HIPPI), Small Computer Systems Interface (SCSI), and Intelligent Peripheral Interface (IPI). Also, Fiber Distributed Data Interface (FDDI), ATM, Token Ring, and Ethernet LAN traffic will be supported. To gain acceptance as a network solution, Fibre Channel will need to ensure interoperability among different vendors' products. Recently, a Fibre Channel Systems Initiative (FCSI) has been formed by Hewlett-Packard, IBM, and Sun Microsystems to address the interoperability issue. The FCSI is developing three profiles providing enough details for vendors to produce interoperable products. These profiles include:

1. Storage profile—design guidance for products used in point-to-point data storage applications such as backing up data to disk arrays
2. Networking profile—defines IP encapsulation for transmission

over Fibre Channel networks and design guidance for switches

3. Internetworking profile—defines interfaces between Fibre Channel equipment and existing LAN protocols for legacy network support

Fibre Channel defines a protocol that can be implemented in hardware. Fibre Channel architecture represents a true channel and network integration. The channel characteristics include simplicity, predictable performance, and guaranteed delivery. The network characteristics include high connectivity, long distance, and protocol multiplexing. Fibre Channel thus provides both the I/O and high-speed network connectivity. See *Figures 8 and 9*.

Photonics

Photonic computing, switching, and transmission are the three technology drivers that will have tremendous impact on high-performance interconnects of the 1990s and beyond. All-electronic interconnects impose a communications bottleneck, since the link bandwidth and the physical distance these links can cover are limited by power dissipation and electronic crosstalk. Optoelectronics and photonic technologies could play a critical role in the future architectures of highly scalable and flexible interconnects for multicomputer parallel processing systems.

Lightwave communication is still an evolving technology. Recent notable advances include Erbium-doped Fiber Amplifiers (EDFA), Multi-Quantum-Well (MQW) Lasers, and Soliton transmission systems. EDFAs provide enhanced link performance, high gain, and near ideal noise properties. MQW Lasers provide higher emitted power, narrow line width,

and wider wavelength tuning range. The highest bit-rate per distance has been achieved with Soliton transmission technology. High-speed transmission systems operating at 10 Gbps over 20,000 kilometers are close to commercial availability utilizing EDFAs, MQW Lasers, and Soliton transmission technologies. Up to 100 Gbps speeds have been demonstrated using photonic multiplexing and demultiplexing technologies.

At distances of less than 10 meters, especially at the board level, we are at the threshold of developing Integrated Photonic Circuits (IPC) that may rival Integrated Electronic Circuits (IEC). There have been convincing feasibility demonstrations of IPCs. Integrated photonic circuits would enable optical switching and massively parallel optical computing architectures. These architectures would require speeds of terabits per second (Tbps). Photonic transmission systems could potentially provide Tbps speed.

Applications of the high-speed light-wave interconnects include the following:

TELECOMMUNICATIONS

- broadband integrated services digital network (B-ISDN)
- high-definition television (HDTV)
- desktop videoconferencing
- remote interactive education programs
- cellular communication

ADVANCED COMPUTER SYSTEMS

- graphics
- real-time image processing
- parallel processing

Conclusion

Switching hubs are becoming part of the LAN infrastructure for high-end computing and bandwidth-intensive

applications. This will allow some users the option of squeezing one to three years out of investments in existing LAN technologies. The 100VG-AnyLAN offers an easy, cost-effective migration path for Ethernet and Token Ring users who need more bandwidth but also require backward compatibility with existing applications, LAN hardware, and cable. As network complexity and bandwidth demand increase, no single technology can provide an adequate solution that addresses the diverse communications requirements of users. Therefore, one can visualize the emergence of the "ideal information utility" that will incorporate shared media access networks such as 100VG-AnyLAN with ATM and Fibre Channel switching fabrics. Along with wireless communications, this "networking technology triad" would move us closer to offering universal information services—the ability to provide any combination of voice, video, and data anywhere, anytime, with convenience and economy. ■

Mohammad Malik is an information technology engineer at Hewlett-Packard Worldwide Customer Support Operations (WCSO). He is currently involved in developing the infrastructure and management strategies for the WCSO production network.

Sam Sudarsanam is a system management engineer at the Professional Services Division at HP. He is primarily responsible for network customer training courses and is involved in developing LAN, WAN, X.25, Introduction to Data Communications, and network management customer courses.

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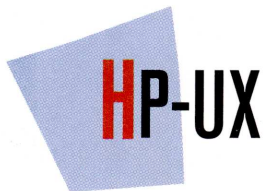


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by David L. Totsch

A Use for adb(1)

NOT LONG AGO, I WAS helping a friend with a 700 system. She had a patch that she had been assured had been applied, but she could not find the fileset information under `/system` (somebody had come along and blown it away under the pretence of saving disk space). What really bothered us was that Glance was showing us system table sizes that were not the same as what was listed in the system's *dfile* (I was beginning to wonder just where this kernel might have come from). Here are the steps we took to get the kernel to cough up its configuration:

```
# what /hp-ux
/hp-ux:
FILESET BSDIPC-SOCKET: Lib uipc: Version: A.09.00
FILESET NETIPC: Lib nipc: Version: A.09.00
lan2.c 9.0 w/ Arbitration, Cmplt bit, and wait-for-clear SCB
FILESET LAN: Lib lan: Version: A.09.00
FILESET NETINET: Lib inet: Version: A.09.00
FILESET NET: Lib net: Version: A.09.00
FILESET NFS-RUN: Lib nfs: Version: A.09.00
PATCH_9.01: async.o $Revision: 901.4 $ $Date: 93/03/10 16:41:45 $
B2352A HP-UX (A.09.01) #3: Fri Dec 18 09:16:31 MST 1992
# echo "dfile_data?s" | /usr/bin/adb /hp-ux
dfile_data:
dfile_data:      async
nfs
nipc
inet
ni
netman
lan01
scsi
scsitape
sim0
eisa
CharDrv
parallel
asio0
cdfs
pty0
pty1
diag1
dmem
dconfig
netdiag1
uipc
shmmni           200
shmseg           120
semmns           200
```


This revealed that the system did, indeed, have the patch we wanted (an async I/O patch). It also gave us a *dfile* to begin with. After playing with that, I wondered if I could get my 800 systems to do the same thing. Here is what I found:

```
# echo "s800_data?s" | /usr/bin/adb /hp-ux
s800_data:
s800_data:
##### RATS! NOT WHAT WE WANTED...
##### LETS TAKE A STAB AT PRINTING IN SYMBOLIC FORM:
# echo "s800_data?p" | /usr/bin/adb /hp-ux
s800_data:
s800_data:      shminfo+24C
##### YES!
# echo "shminfo+24C?s" | /usr/bin/adb /hp-ux
shminfo+24C:      /* $Source: /extra/kcs/sys.NEW9_800/regen/templates/847/RCS/min,v $      */
/* $Revision: 1.2.53.3 $      $Author: cherry $      */
/* $State: Exp $      $Locker: CRT $      */
/* $Date: 92/06/17 21:04:41 $      */

/* Model 847 */
#include "/etc/master"
include lv;
include lvm;
include nfs;
include lan;
include ni;
include nm;
include inet;
include nipc;
include uipc;
include target;
include tape2;
include scsi1;
include processor;
include mux2;
include memory;
include lpr2;
include lanmux0;
include lan3;
include disc3;
include asyncdsk;

remove ac;
/* include statements */
include hpib1;
include diaghpib1;
```



```

maxusers      32;
nfile         "(16 * (NPROC + 16 + MAXUSERS) / 10 + 32 + 2 * NETSLOP)";
nstlbe        1024;
ntext         "(24 + MAXUSERS + NETSLOP)";
semmap        10;
timezone      480;

```

```
/* on statements */
```

```

console on      mux2      at 56;
dumps   on      default;
root    on      lvol;
swap    on      lvol
/* swap statements */ ;

```

```
/* io statements */ /* (if needed) */
```

```

io {
}

```

```
# what /hp-ux
```

```
/hp-ux:
```

```

diag0.c      $Date: 92/08/21 16:14:32 $ $Revision: 1.29.53.10 $
disc3.c      $Date: 92/07/30 12:27:53 $ $Revision: 1.8.53.31 $
disc30.c     $Date: 92/08/04 16:09:12 $ $Revision: 1.8.53.22 $
lpr0.c       $Date: 92/07/20 11:29:07 $ $Revision: 1.54.53.9 $
tape0.c      $Date: 92/06/17 17:46:22 $ $Revision: 1.87.53.11 $
tape14.c     $Date: 92/08/03 09:17:42 $ $Revision: 1.5.53.22 $
cent0.c      $Date: 92/03/23 14:33:44 $ $Revision: 1.5.53.5 $
mux2.c       $Revision: 1.13.53.15 $ $Date: 92/08/04 14:52:29 $
lanmux0.c,v  $Revision: 1.1.53.9 $ $Date: 92/06/30 14:04:04 $
scsi1.c      $Date: 92/08/17 17:45:45 $ $Revision: 1.8.53.24 $
9245XA HP-UX (A.09.00) #0: Wed Aug 4 17:30:11 PDT 1993
PATCH_9.0_9.01: hptt0.o 1.5.109.26 93/05/18
mux3.c       $Revision: 1.8.53.7 $ $Date: 92/06/30 14:04:15 $
cio_ca0.c    $Date: 92/03/23 14:33:48 $ $Revision: 1.95.53.3 $
FILESET BSDIPC-SOCKET: lib uipc: Version: A.09.00
FILESET NETIPC: lib nipc: Version: A.09.00
FILESET LAN: lib lan: Version: A.09.00
FILESET NETINET: lib inet: Version: A.09.00
FILESET NET: lib net: Version: A.09.00
diaghpib1.c  $Date: 92/03/23 14:33:56 $ $Revision: 1.3.53.3 $
hpib1.c      $Date: 92/07/08 20:39:04 $ $Revision: 1.8.53.4 $

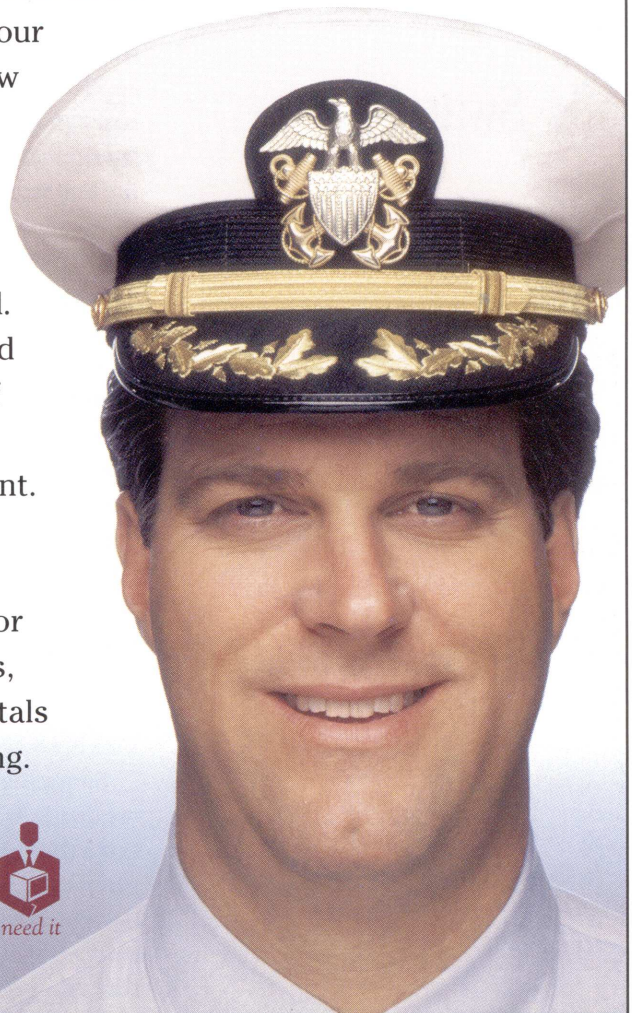
```


The *what(1)* command actually retrieves the SCCS information from a file. If you have a core file suddenly appear, you might be able to figure out what died by running the *what* command on said core file, provided the developer used SCCS and placed intelligible information with it. ■

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David L. Totsch has worked in several different organizations over the past seven years as a system administrator with various flavors of UNIX. At present he is working with HP-UX systems and wide-area networks for a Fortune 100 company in the Piedmont area of North Carolina.

Swap Space

ONE OF THE ADVANTAGES OF using a multi-tasking, multi-user operating system such as HP-UX is the ability to run multiple programs at the same time, in the same memory. This is accomplished using virtual memory and swapping.

Virtual memory allows HP-UX to let each application think that it has total control of all memory. It also allows an application to be written to disk if there is not enough available real memory and later reloaded, while still running, when the application needs the CPU.

Why Swap?

Swapping allows the operating system to remove or move programs in physical memory when necessary. Most applications spend their time waiting for an event to occur. *vi* waits for the user to type something. *cron* waits for a signal from the kernel to wake up to execute commands. While these programs are waiting, they are taking up physical memory. If the operating system detects that there is not enough physical memory available to execute a program, it may write part or all of an application to disk. This is known as swapping.

Swapping is important because, theoretically, it allows you to run applications that use more memory than you physically have. I say "theoretically" because if you are running applications that constantly require CPU time, thrashing occurs. Then the operating system spends more time moving applications to and from swap than it does executing applications. Performance degrades quickly when this happens. I have seen thrashing reach the point that nothing seems to be running on the system.

Your applications do not know they have been swapped, because the operating

system reloads the application into memory before "waking it up." The application then continues along. Since the operating system can swap parts of an application to disk, it can swap pages of memory that have not been used for a period of time.

Whole sections of books are devoted to swapping algorithms and virtual memory, so I will not get into how the *swapper* program decides what to swap, and when.

HP-UX provides two types of swapping. The first is Device Swap. Device Swap uses a section of your disk for swapping. This section is reserved and cannot be used for any other reason. The second is File System Swap. This type uses disk space from the file system as temporary swap. Each has specific advantages and disadvantages.

Device Swap

Device Swap is the preferred form of swap for HP-UX. Device Swap requires you to set aside a fixed amount of your disk for use only by the operating system for a swap area. You must have at least one (and may have more than one) Device Swap section configured.

The advantage of Device Swap is that it is very fast. Rather than using the normal file I/O functions to write to the disk, the swap program, *swapper*, can write directly to the disk since it knows how much space it has to use.

One of the disadvantages of Device Swap is that its size is fixed. When you install HP-UX or add additional swap, you must set aside part of the disk; you will not be able to access it later as part of a normal file system.

File System Swap

File System Swap is a backup form of swap. You should use File System Swap



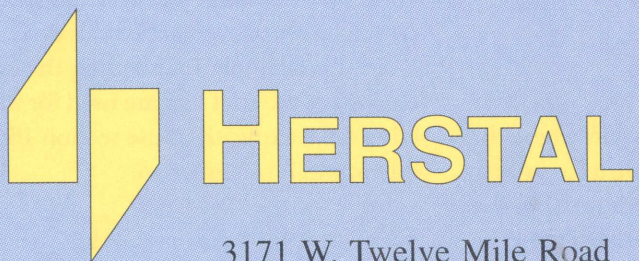
23:30

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only in extreme conditions. File System Swap dynamically uses file system space for swap areas. Configuring allows a minimum and maximum amount of disk space to be specified, and *swapper* will use this space, but only as a last resort.

The advantage of File System Swap is that it is dynamic in size—you can add an area easily, while removing an area requires only a reboot. The disadvantage is that it is much slower since *swapper* must use normal file I/O. File System Swap also requires you to set aside a minimum amount of file system space that can be used by *swapper*. This is smaller than the amount required by Device Swap, but if you are going to give up space, then at least get the faster method of swapping.

Estimating Swap Space Requirements

The hardest part of configuring a system is determining how much swap space to have. A lot depends upon what you will be running on the system. A system with a large database, multiple users, and a graphical user interface will require more swap space than a stand-alone workstation used for CAD drawings.

I recommend contacting your software suppliers for their memory and swap requirements and then adding twice the size of physical memory. For example, if your applications require 80 MB of swap and you have 80 MB of physical memory, you can use 240 MB of swap space. Your requirements will definitely be different and you may have to use File System swap as a temporary solution until you know exactly how much swap space you need. Then resize your Device Swap and remove the File System swap.

One good rule of thumb is to have at least as much Device Swap as physical memory on the root disk. This way, if the kernel panics, it can drop a complete core file into the swap space. If you do not have enough primary swap space, important information will be lost. I learned this the hard way. A kernel panic dumped a core file that was not complete so HP was unable to determine what caused the system to panic. (For a good description of kernel panics and what to do about them, see Dennis McClure's article in the January 1994 *hp-ux/usr*.)

Dump Device

When configuring your kernel, you must specify where the primary swap space is and where kernel dumps are to be written.

On an 800 series (or Letter series) this is defined in the */etc/conf/gen/S800* file. On a 700 series this is defined in the

/etc/conf/dfile file. Each of these files can be configured using SAM. However, I think it is good to understand what SAM is doing.

On the 800 series, there are two ways of partitioning your disks. The first is the traditional method of dividing the disk into physical sections. This method produces some odd-sized disk partitions and severely limits your choices for the size of swap. Unless you get lucky and your disk has a partition that exactly meets your requirements, you will either have to pick a section that is too large or combine several smaller sections. In either case, you will have at least one section of disk that is oddly sized. If you can, use Logical Volumes instead.

The second option on the 800 platform is Logical Volumes. This scheme allows you to specify exactly how much space each file system will have. You can assign the exact amount of swap space you need. You can easily add additional disks or sections later to increase the amount of swap you have and the file system sizes.

In either case the *S800* file has a section for defining the location of the system console, the root disk, the primary swap section, and the place where any kernel dumps will be written. It looks like the following:

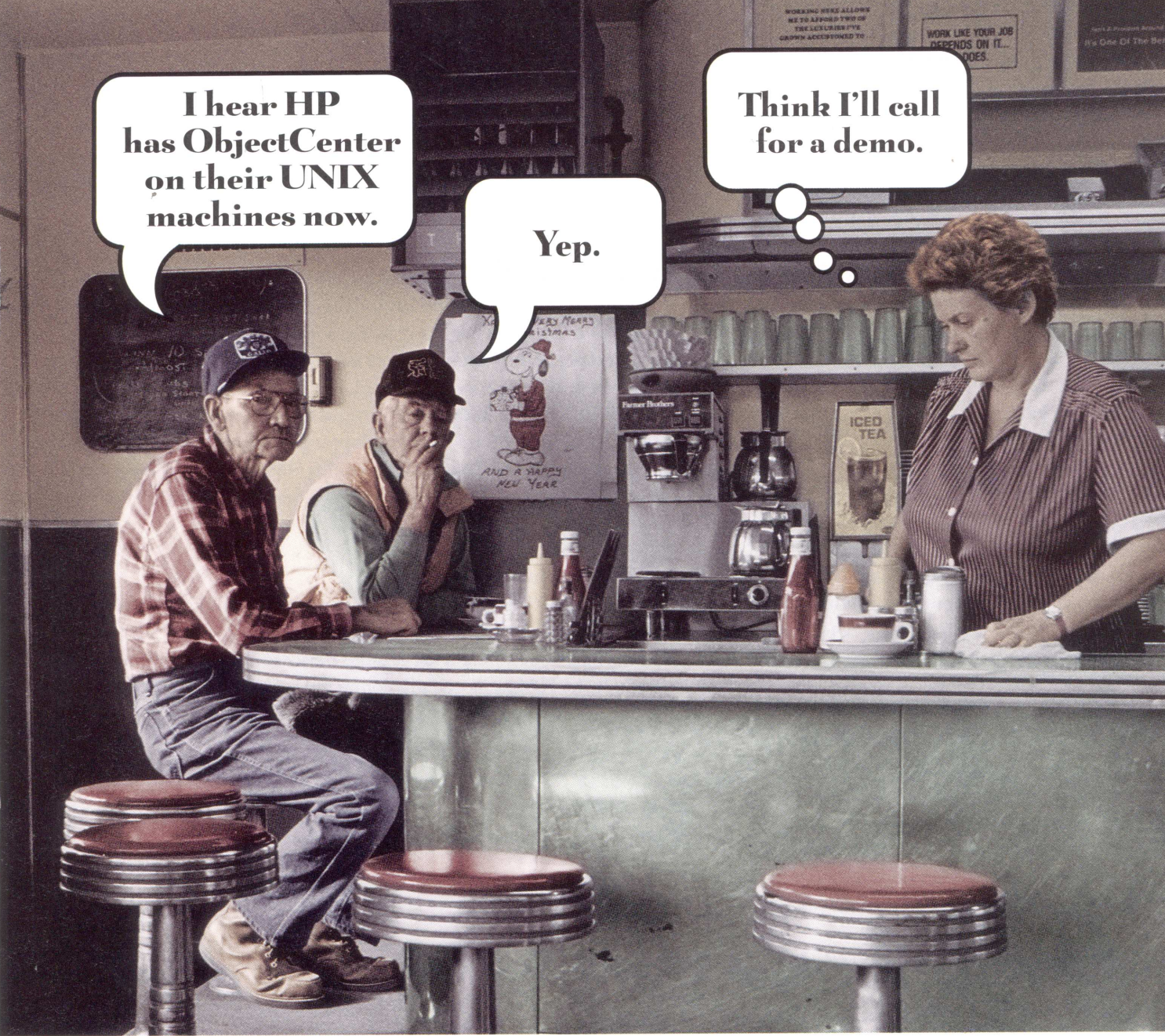
```
/* Console, Root, Swap & Dumps Devices */
console on mux2 at 56
root   on scsi1.target.disc3 at 52.6.0
swap   on scsi1.target.disc3 at 52.6.0
dumps  on scsi1.target.disc3 at 52.6.0
```

(This is from my 827 *S800* file.) The first line defines where the console is. In this case the driver for the console is *mux2* and the console is attached at physical address 56. This information is from the *ioscan(1M)* command. The next three tell the kernel where the root disk is located, where the primary swap partition is located, and where to dump kernel cores.

In this case I am explicitly telling the kernel which disk to use. I have two other disks on this system and I do not want the kernel to use them. The *scsi1.target.disc3* field is the kernel device driver used to access this disk.

In this example I am letting the kernel determine which sections of the root disk are used for which purposes. If I wanted to tell it explicitly to use section 16 for swap, then the swap line would be changed to:

```
swap on scsi1.target.disc3 at 52.6.0 section 16;
```

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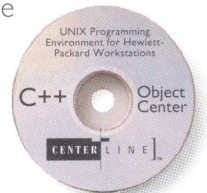
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In the case of using Logical Volumes, change the root, swap, and dumps to:

```
root on lv01;
swap on lv01;
dumps on lv01;
```

This tells the kernel that the Logical Volume Manager knows where these sections reside. I am not going to discuss combining sectioned disks with LVM disks since I have never done it, nor do I know anyone who does. Most people use one or the other scheme, but not both.

The 700 series has an easier partitioning scheme. You specify what part of the disk is being used for swap and the rest is used for the file system. In this case the default *dfile* does not have any information about where the root disk, swap space, or dumps area is located. It is assumed that they are all on the disk that the kernel was booted from.

If you want to change where the dumps are located, use the following:

```
dump scsi 201400
```

This assumes that the new dump disk is a scsi disk with a bus address of 4 (the fourth digit). Likewise, the primary swap section can be changed by using the following:

```
swap scsi 201200
```

This assumes that the scsi bus address is 1.

While it is possible to use SAM to do this, I recently discovered that SAM uses the default values when building the *S800* or *dfile* unless you explicitly tell it otherwise. Your system will run fine until

you try to use */etc/update* to patch the kernel.

What I encountered was that update was looking at what the kernel was using for its swap and dumps devices, then looking in the *S800* or *dfile* to see what they were set to. If the two did not exactly match, update would complain and stop the update. I suspect that when update queried the kernel, it read the actual paths used, since somewhere the default entries in the *S800* file must be updated. But when it looked at the *S800* file, it could not perform the mapping from 'default' to the actual values. This was annoying because I had to modify the *S800* and *dfile* for update to finish, and the change had absolutely no impact on what the kernel was doing or how it was configured!

Determining Existing Swap Space

Finally, as of HP-UX 9.0, there is a supported way of determining available swap space. In releases prior to 9.0 you had to execute one of SAM's programs, */usr/bin/sam/swapinfo*, to generate a list of swap devices with the amount of space available in each. In 9.0 HP has moved this command to */etc/swapinfo*. The following is the output from */etc/swapinfo* on my 827:

	Kb	Kb	Kb	PCT	START/	Kb		
TYPE	AVAIL	USED	FREE	USED	LIMIT	RESERVE	PRI	NAME
dev	48560	19192	29368	40%	-	-	0	/dev/dsk/c0d0s15
dev	129024	0	129024	0%	-	-	1	/dev/dsk/c1d0s10
dev	24280	1752	22528	7%	-	-	1	/dev/dsk/c1d0s14
dev	48560	1456	47104	3%	-	-	1	/dev/dsk/c1d0s15
dev	129024	0	129024	0%	-	-	1	/dev/dsk/c2d0s10
dev	24280	1752	22528	7%	-	-	1	/dev/dsk/c2d0s14
dev	48560	1456	47104	3%	-	-	1	/dev/dsk/c2d0s15
hold	0	92372	-92372					

The first field is the type, either *dev* or *fs* for Device Swap or File System Swap. I use only Device Swap because of the large amount of disk space I have.

As you can see, I have a lot of swap space allocated and I am using multiple physical disks. This system has 128 MB of RAM. Also, since the first swap section is only 48 MB, I do not have enough space to save a complete kernel panic. I will make sure that this will not happen with the next system I configure.

The *hold* field defines the amount of space that the operating system has reserved, but is not using. This ensures that should every program be swapped to disk, there will be enough space to store them all.

Increasing Swap Space

Unfortunately the only way to increase your primary swap space is to reinstall the operating system on the primary swap disk. You can reassign the primary swap area to another partition, but in most cases you are using that partition for a file system and must delete it.

If you are going to reinstall to update your swap space, I recommend that you install using Logical Volumes. This way you can resize your secondary swap areas

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later without reinstalling. LVM also gives you the ability to specify exactly how much space you want.

If you are using partitioned disks, the only way to increase your secondary swap areas is to repartition the disk that the swap area resides upon. Again, upgrade to LVM while you are doing this. If you are already using LVM, you can grow (or shrink) your secondary swap areas using the LVM commands. Unlike most other tasks, I recommend using SAM to do any modifications to your Logical Volumes. There are literally dozens of steps that you must complete to change the size of a Logical Volume, and forgetting one or doing it incorrectly can be a disaster.

It is important to note that you cannot change the size of your primary swap or root file system if you are using LVM. So when you are installing HP-UX, give yourself some room to grow, especially in the root disk, since HP-UX has steadily increased in size every release. If you are using partitioned disks, you have no choice but to reinstall.

Primary and Secondary Swap Space

There are two types of Device Swap space: Primary and Secondary. The Primary swap is the area on the root disk set aside for swapping. This is the area *swapper* will first try to write to. If this section does not exist, the kernel will not start when you reboot. I strongly recommend that this area be at least the size of physical memory, again to catch kernel panics. This should also be your fastest disk, since your system performance is linked to how fast you can swap.

The Secondary swap areas are at least equally as important as the Primary swap. While the kernel needs the Primary swap area to start, using a Secondary swap on another disk will significantly increase your performance since the disk controller can work in parallel—*swapper* can send a write request to one swap area and a read from another. If you look at the output from the */etc/swapinfo* above, you will notice that some of the sections on the second and third disks are being used, even though the Primary swap is not totally used up.

One option when defining swap space is priorities. Each section of disk used for swapping has a priority. The lower the number, the higher its priority. The higher the priority, the more likely *swapper* will write something to it. The Primary swap area has a priority of 0. The Secondary swap areas have priorities of 1 to 10. In my case, all the Secondary areas have an equal priority of 1. Assigning a higher number to a slower

disk makes *swapper* favor the faster disks but still use the slower one if necessary.

Configuring Swap Space

By far the easiest way to define what swap areas you are using is through SAM. SAM presents a list of disk sections available, their sizes, and the disks they are located on.

What SAM does when you add swap space is modify the */etc/checklist* file. */etc/checklist* contains information about the file systems your system knows about. This includes swap space, local file systems, and NFS mounted file system.

Each entry in the checklist file is for one specific disk or disk section. In the case of swap, there is one entry for each swap device. An example of a Device Swap entry is:

```
/dev/dsk/c0d0s15 swap swap pri=0 0 0 # Primary
                                Swap Area
/dev/dsk/c2d0s14 .... swap defaults 0 0 # Disk
                                3 Swap Area
```

The first line defines the Primary swap area. The first field is the block device file for the physical section to be used. (If you are using LVM, this will be the logical volume in a volume group.) The second field is the mount point. Since swap does not have a mount point, use a holder. For the Primary swap area, I always use *swap*. For the other areas, I use "...". The *swapon* program does not care what is there, as long as the field is not empty.

The third field defines what the section is used for. In this case, use *swap*. The fourth field defines configuration parameters depending upon what the disk section is used for. In the case of swap the only option is the priority. In this example the first entry uses a priority of 0, making it the Primary swap area. The second line uses *default*, which means a priority of 1. The fifth and sixth fields are not used with swap, but are reserved for use by backup software and *fsck*. The final field is a comment. I do not know why SAM sometimes places a number in this field, but anything after the sixth parameter is ignored.

Note: You must reboot your system after modifying the */etc/checklist* file if you have added or deleted swap sections. While you can use */etc/swapon* to add swap space while running, I prefer rebooting.

I hope this has given you a good overview of swap space

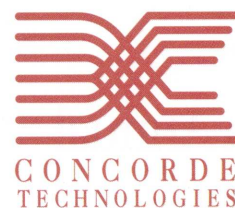
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systems administration

and how HP-UX uses and manages it. I used the *Systems Administration Tasks*, *How HP-UX Works: Concepts for the Systems Administrator*, and *LaserRom* to research and write this column. The *Tasks* manual goes into detail about using SAM to configure swap space and includes a checklist for determining exactly how much swap space you may need. Carefully reading the sections in both manuals will provide more details than I can in one column.

In my last column I mentioned a book about smiley faces. I received a lot of e-mail from readers wanting to know the name of the book. Naturally, I cannot find the name. I had a copy of it once and cannot find it. I also looked in all the book stores around here and none of them had it. If you know the name, please send me some e-mail.

One thing I did find was a program called *smiley* that will decode what the smiley faces mean. It is available from ftp sites and on the CD-ROM included with *UNIX Power Tools*, a book

published by O'Reilly and Associates.

Thanks for all the e-mail; keep it coming. The idea for this column came from a reader who wanted more information about swap space. If there is something you would like me to write about, let me know through e-mail. ■

Chris Curtin, a software developer for Bradley Ward Systems, Inc. in Atlanta, Georgia, specializes in device driver development for factory automation on the HP 9000. He can be reached via e-mail at: chris@bwilab3.atl.ga.us

by Larry Headlund

Eighth Annual X Conference

AS I WRITE THIS, I AM just back from the Eighth Annual X Conference held in Boston. While all X Conferences are important, this one included peeks at the upcoming X11R6 and Motif 2.0 releases, making it a particularly appropriate topic for a column. I won't even try to cover everything that was presented at the conference. Those wishing a more detailed look should check out issue nine of *The X Resource*, which contains the proceedings of the conference. Not all the material I present here is included in the conference proceedings. Some came from conversations in the hallway. More came from the BOFs. BOFs, for those unfamiliar with the term, are Birds Of a Feather meetings. Since birds of a feather flock together, BOFs are more or less informal meetings of people with similar interests. I say more or less informal because some BOFs, and the ones for Motif and CDE/COSE were of this type, have presentations from the organization in charge and questions afterwards.

Avoiding a Deadly Embrace

There are now three big players in the X world. One, the X Consortium itself, is making an organizational change and will no longer be the MIT X Consortium operated within the MIT Laboratory for Computer Science but will become the X Consortium, Inc. At the same time, Bob Scheifler, interim President of the X Consortium, past President of the MIT X Consortium, and the man without whom this column wouldn't exist (or would at least have a different name), is returning to research. The X Consortium expects to release X11R6, the next new features release, in April/May/June 1994.

The second player is the Open

Software Foundation (OSF). OSF is the producer of Motif, currently at 1.2.x. The major update to Motif 2.0 is expected to be released this summer. (By the way, if you believe these or any other dates or features mentioned in this article are in anyway authoritative because I said them, well there are some high-yield bonds I think you would be interested in.)

The third and newest player is the Common Open Systems Environment (COSE), which has spawned the Common Desktop Environment. The CDE, which includes new widgets to be incorporated into Motif and which is itself based on Motif 1.2, is scheduled for release this year.

I could see real possibilities of a perpetual game of "After you, Gaston" as each player waited for the other to finish before proceeding. This has been avoided. As the fundamental, the X11R6 release will be first. The Motif 2.0 release will proceed independently of CDE. This does not cause any major problems for CDE because Motif 2.0 is compatible with 1.2. I wouldn't be surprised to see some additional widgets folded into Motif 2.x as the CDE develops.

At the same time, there may be some responsibility shifting. One of the features of the CDE was printing with a printing description language the same as the screen description language. That is, you would use your standard Xlib and toolkit API to describe what you wanted printed and there would be some additional calls to initiate and specify printing. The sense I got from the CDE BOF is that printing *may*, repeat *may*, not be part of CDE and that there is a feeling this functionality belongs at the X layer, maintained by the X consortium. This is still very nebulous.

New in Motif 2.0

One worry with the CDE was the fate of the nifty new widgets it contained. These widgets included a ComboBox, a SpinBox, a Notebook, and a terminal widget. The source of worry was possible GUI wars redux between the CDE and Motif with different sets of widgets. These new concerns revolve about what happens if CDE doesn't fly and about source code availability. After all, the COSE initiative has no mechanism in place for making source code available to nonparticipants. On the other hand, OSF has a well-understood procedure for source code access and reasonable prices. This is especially important for developers like me, who need source code access for some products. The news is that the new widgets for 2.0 will include a ComboBox, a SpinBox, and a Notebook.

The ComboBox widget would be familiar to any users of MS Windows. It is a text field with a button next to it. Pressing the button brings up (pulls down) a list of selections. Making a selection copies to the text field. The SpinBox is a similar real estate saving way of making a selection. Think of it like the thumb wheels to set your SCSI addresses. The Notebook is a new container widget that permits you to have pages with index tabs for access. This concept has been widely popularized in MS Windows spreadsheets and in pen-based interfaces such as the one for the Apple Newton.

A more profound addition to Motif is the concept of traits. As the X Conference speaker Daniel Dardailler explained, the trait abstraction was first introduced by Xerox during the development of the Star. (As a side note, if I had a nickel for every time I have heard or read the phrases "Originally developed at Xerox Parc...", "...based on concepts from the Xerox Star...", "...first implemented at Parc ...," in the last several years at computer conferences and in journals or magazine articles, well I would have a lot of nickels.) A trait is a characteristic of an object that can be expressed by a set of operations on or data applied to it or carried by the object holding that trait. Applied to GUI widgets in the X environment, a trait is a sort of meta-resource set, if you think of callbacks as also being resources.

Why bother since we already have resources? One reason is the incestuous nature of Motif widgets. That means the

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XmPushButton widget ends up with bits of the menu system. This does not make for small binaries or easy subclassing of widgets. It also means that fundamentally similar ideas have very different implementations; hence application code must be more widget-specific than is desired.

Time for an example. One trait is XmQTaccessTextual. A widget with this trait is capable of rendering an item of textual data. Widgets with this trait include XmText (one or many lines), XmTextField (one line), and XmLabel (one or many lines). Widgets with more than one parcel of textual data, such as XmList, should not contain this trait. Now it is clear that this abstraction makes displaying text transparent with regard to the widgets that share this trait.

Why not rename some resources in the affected widgets and handle everything that way? Besides breaking tons of users' code, that is. Well, non-widget resources can still be handled by traits and the trait mechanism avoids calls to XtGetResourceList(), which can be very expensive.

Motif 2.0 defines 14 different traits applied to 30 different widget classes. I would expect more to be added in the future. In fact, there are more implemented in Motif 2.0, but they are not documented. They would be exposed in Motif 2.1. Nothing forces the programmer to use traits, but I think this powerful idea will be popular.

Fresco

One of the hot topics in X11R6, and the subject of a crowded tutorial, was Fresco. Fresco is a user interface system, but not another GUI. Instead it can support multiple GUIs. The Fresco 1.0 spec will not include a GUI. This is important—for a while, the “talk on the street” was that Fresco would be a C++ GUI like Interviews. A future version of Fresco will probably specify Motif and/or Chicago, the development title for MS Windows 4.0. The sample implementation for Fresco 1.0 will include some Motif-ish widgets.

Fresco is aggressive about embedding. Applications become embeddable objects. These objects can be in different address spaces, i.e., on different CPUs with different architectures. The Fresco implementation can be considered an advance over ATK, NextStep, OLE 2.0, and OpenDoc.

Fresco is standards compliant. Its interface definition language is defined by CORBA, the objects standards organization. This is, I think, very important. More important to CORBA perhaps than to X. Few complex standards have been successfully implemented without a core, shared code base. Since Fresco is from X, we are going to see a common implementation of the CORBA specification. Since it is from X, we are going to see it on lots of different platforms, so applications compliant with it will have real portability.

Fresco's IDL (Interface Definition Language) is like C++ without the details. The IDL can be bound to C or C++. It supports distribution, that is, it cannot use inherently local constructs. People familiar with other IDLs, say the one for rpcgen, will find it similar. An IDL to C translator (lx) will be shipped with Fresco.

Before I leave Fresco, which I am sure will be the subject of more columns once I get to play with it, I'll note that it will support scripting languages. The one it supports now is TCL from John Ousterhout. I think TCL has the potential to be the EMACS of the 1990s. That is, the source is freely available, it is nonstandard (not shipped as part of systems), it sets its own standards, and it has legions of enthusiastic supporters. I might add that I am not one of its enthusiasts, which it also has in common with EMACS.

Other X11R6 Features

There is no new version of the Athena widgets. That is, no new changes to the Athena widgets are included, although they are still supported. Some things, such as xman, are

moving from the core distribution to the contrib portion. The enhancements to X communications and efforts to make X multithreaded are too much for me to talk about here.

Finding My Favorite Things

In a previous column I listed some of my favorite tools and programs. Many readers had trouble finding them and asked me for precise locations. So here is a list with locations:

WCL: Widget Creation Library

<ftp.x.org:/contrib/Wcl-2.5.tar.Z>
<ftp.x.org:/contrib/Wcl7XTC.ps.t.Z>
<ftp.x.org:/contrib/WclDoc.t.Z>

Winterp: Lisp binding for X and Motif

<ftp.x.org:/contrib/winterp/winterp-1.13.tar.Z>

Elk: Scheme binding for X and Motif

<ftp.x.org:/contrib/elk-2.2.tar.gz>

siod: A small scheme implementation

world.std.com:/sources/lisp/siod-v2.9-shar

Xbae widgets: caption and spreadsheet widgets

<ftp.x.org:/contrib/Xbae-widgets-3.8.tar.Z>

Term: An xterm widget which is Motif compliant

This is no longer on ftp.x.org but is in the contrib section of the X11R5 DNU CD-ROM from Walnut Creek

jedit: A Motif programmers editor

<ftp.cae.wisc.edu:/hpux9/Editors/jedit-1.23.tar.gz>

xmgr: A graphics plotting program

amb4.ese.ogi.edu:/pub/acegr/xmgr-2.07.tar.Z

Note that the files with .gz at the end use gzip for decompression. ■

REFERENCES:

“Proceedings 8th Annual X Technical Conference,” *The X Journal*, Issue Nine, O'Reilly & Associates, Inc.

“A Taste of Fresco,” Mark Linton, tutorial notes.

Larry Headlund is president of Eikonal Systems and has been working with commercial UNIX since 1982 and with X since 1988. He can be reached at (617) 482-3345 or lmh@world.std.com.

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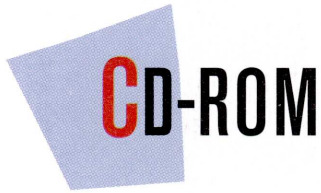
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by Bill Hassell

New CD Jewel Case

THERE IS A NEW packaging option for CD-ROM sets. As an option to packaging a two-CD set in two separate jewel cases, CD customers will now see the same two CDs in a single jewel case. This is accomplished with an insert developed by 3M (CD vendor). The insert is clear plastic and fits under the tabs in the jewel case cover. The plastic insert is molded with a hub on which to mount the CD. The loaded CD may then be inserted so that the CD is visible when the jewel case is either closed or open. In addition, there is still room for a printed insert up to four pages.

3M developed this insert in response to HP's desire to package CD sets in a single package (as opposed to two separate jewel cases shrink-wrapped together). Existing options were not a good fit for our requirements. They either required excessive manual labor to load or didn't allow for a back insert or were too bulky (i.e., didn't reduce the amount of bulk).

The initial introduction of the dual disc jewel case has caused confusion for some customers. Since customers were used to receiving CDs in individual jewel cases, they initially believed one CD was missing.

To prevent customer confusion and reduce calls to the Field, a warning label has been attached to all jewel cases containing two CDs. The warning label will indicate that two CDs are stored within the jewel case.

New CD-ROM drive

The A2655A is a Toshiba 3401 drive in the series 712-style package, which matches the new 9000 series 712 boxes. Several changes have been made from the old A1999A drive:

The SCSI connector is the small, high-density style with jackscrews to

hold it in place. The A1999A uses the large, low-density connector with bail wires to hold it on. Cables are not interchangeable.

The drive mechanism is the Toshiba 3401, which is the first double-speed drive for HP (the Toshiba XM-3401TA), so serial transfers such as updates should be quite a bit faster (300 Kbytes/sec).

Bill Hassell is an HP-UX system support engineer at the HP Atlanta Response Center. He can be contacted at his e-mail address, which is blh@hpuaerca.atl.hp.com.

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DENVER, THE MILE-HIGH CITY and site of Interex '94, September 18-22, is a young and green city boasting dozens of parks and tree-lined boulevards. Attendees of this **Hewlett-Packard Computing Professionals Conference & Expo** will find not only a wealth of information on HP systems but an array of attractions for all interests—most within easy driving distance.

The city is home to some of the finest museums in the West, including the **Denver Art Museum**, housing what is considered one of the finest collections of American Indian art works in the world. The **Museum of Natural History**, the fourth largest museum of its kind in the nation, features more than 80 dioramas depicting animals from around the world, plus an outstanding dinosaur collection.

The Museum of Western Art has the third largest collection of Western art in the nation, including classic Frederic Remington and Charles Russell paintings, all housed in a restored Victorian building that at one time was Denver's classiest bordello and gambling hall. Artists exhibited include Georgia O'Keeffe, Thomas



Moran, Albert Bierstadt, and Norman Rockwell.

The United States Mint, modeled in the Italian Renaissance style, is a 1904 structure that strongly resembles the Palazzo Riccardi in Florence. Free 20-minute tours are offered weekdays, giving visitors the opportunity to watch dull metal blanks being stamped into familiar shiny quarters, dimes, nickels, and pennies. Over five billion coins are made here each year.

Denver is also a sports capital, offering over 130 miles of paved, off-street bike paths, including a stretch along the south Platte River. The area boasts more than 40 golf courses and more than 143 free tennis courts.

Within an hour and a half drive from Denver are opportunities for skiing, river running, hiking, fishing, camping, horseback riding, sailing, or mountain biking.

In fact, half of Colorado is public land open to all forms of recreation. The land boasts two national parks, six national monuments, 11 national forests, three national recreation areas, and 30 state parks.

One-Day Excursions

Located at the base of the Rockies, Denver is an excellent base from which to tour the beautiful and historic Front Range of the mountains. Some day trip tours include:

Central City and Black Hawk—two historic mining towns from the 1870s that have come alive with limited-stakes casino gambling. Located 34 miles west of Denver, the two towns offer almost 40 casinos with nearly 7,000 slot machines, blackjack tables, and poker games.

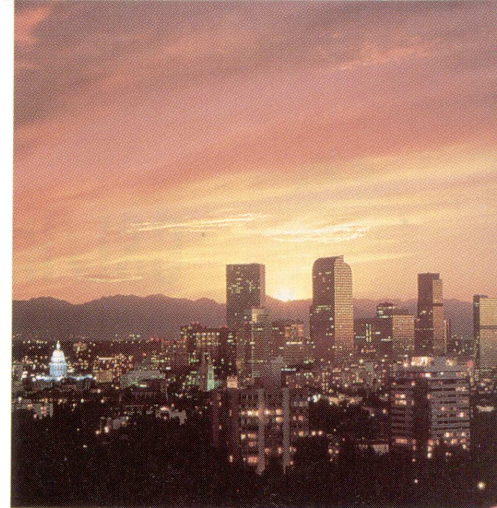
Georgetown—a delightful Victorian village with 200 restored buildings from the 1870s, set in a spectacular mountain valley.

Pikes Peak Country—only 60 miles south of Denver, it features more than 40 attractions centered around 14,000-foot-high Pikes Peak. Sights include the Air Force Academy and the famous Broadmoor Resort, with its lake and three golf courses.

Rocky Mountain National Park—71 miles northwest of Denver and featuring 400 square miles of scenic beauty. Trail Ridge Road, the highest continuous highway in the world, crosses the Continental Divide at over 2 miles above sea level. The park has hundreds of miles of hiking trails, tranquil lakes, waterfalls, wildlife, and horseback riding.

Colorado offers river running at all levels of difficulty. The easy stretches offer exciting rapids, tranquil floats through canyons, and spectacular scenery. A nice stretch of the Platte River offers river running and kayaking within the city of Denver. For the novice, day trips are available on the Colorado River through Glenwood Canyon and on the Arkansas River near Buena Vista. On these day trips, you'll be back in the city in time for a late dinner.

Ballooning has also become a very popular sport in Colorado. Private companies offer various packages allowing novices to



soar into the sky and look out over miles of snow-capped peaks.

In Denver, you also can choose from some of the most exciting cultural facilities in the country.

The **Denver Performing Arts Complex**, known as "The Plex," is a nine-theatre facility with more venues than any other performing arts center in the country.

At **Red Rocks Amphitheatre**, the city's favorite musical concert site, 9,000 seats have been carved out of stunning red sandstone cliffs—all overlooking the lights of Denver.

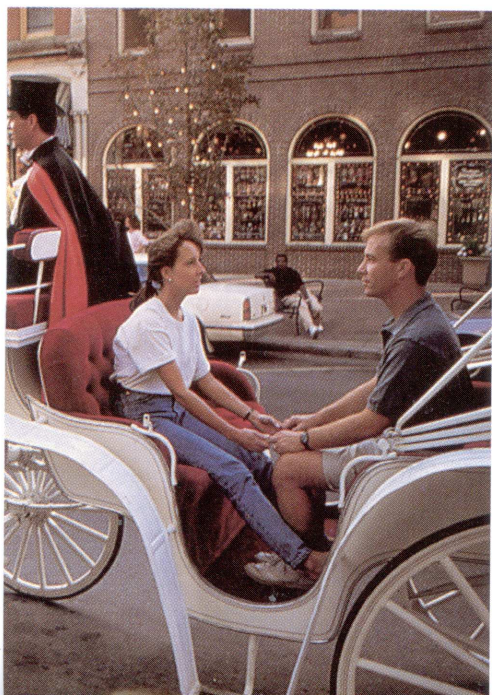
Shop Till You Drop

One of Denver's biggest attractions is the mile-long **16th Street Mall**. Department stores, restaurants, and shops line this pedestrian mall, and the buses running up and down it are free! Along the Mall, you'll find the **Tabor Center** with 70 shops in a three-level glass atrium.

More shops and restaurants line historic **Larimer Square**, where elegant Victorian buildings surround quiet courtyards and lanes.

You'll see one of the key attractions upon your Denver arrival. The new **Denver International Airport**, the world's largest airport, encompasses 53 square miles—twice the size of Manhattan Island. Located 24 miles from downtown, the new facility has an underground automatic train linking the terminal to the initial 84 gates on three concourses. A new baggage handling system uses underground tunnels and 20 mile-per-hour conveyor belts to get baggage to the terminal before passengers arrive.

See you in September!





CSL/HP-UX

FIRST, SOME QUICK ITEMS of potential interest to readers:

The CSL mailing list is now active. Unfortunately, not many of you have made use of it. I find mailing lists to be a great way to keep abreast of what's going on and to ask questions of those who may know more about a subject. See the CSL Department in the January 1994 issue of *hp-ux/usr* for more details.

One of the action items from the recent committee meetings is to incorporate the indices of the HP-UX CSL into the current online indexing system. Once this work is accomplished, members will be able to scan the entire CSL (including MPE and RTE libraries) based on keywords, contributor, and program name. This system also ties into the software download capabilities that the MPE community has had for several years. We see this merging of the index to be a key enabler in providing more online access to members. We are also in preliminary phases of designing a graphical user interface to the index and would like to ask for volunteers to work on it over the next year. If you are interested, send me a message.

The 1994 Interex Conference and Expo is quickly approaching. I'm looking forward to another great conference, to be held this year in one of my favorite places in the country, Denver. I may even bring my hiking boots and day pack for a quick jaunt in the mountains! But I'm also looking forward to having each of you pay a visit to the CSL booth on the show floor. We will have some of the more popular CSL programs running for you to view, plenty of literature to take home, and even some surprises. We are always looking for volunteers to spend an hour or two in the booth, helping us out. It is a big job, and the more, the merrier.

In the last issue of *hp-ux/usr*, I shared a few thoughts about how the UNIX marketplace is moving forward. I spoke about tools and processes that need to be put in place to overcome some of the barriers we face each day.

The area of information systems management is quite broad and is made up various components, disciplines, processes, and procedures. It has both technical and human components which, when brought together, will shape the business of "system management" or "system administration." I have been working on categorizing the management processes that are already present in a computing environment and showing the high-level interactions that should or do occur. These then form the basis of further design and eventually implementation. As we plan the implementation phase, we are identifying existing tools and other software that might be useful. I am amazed at the sheer number of tools available on the Internet, and some of these tools have impressive lists of features and capabilities that in some cases are better than the commercial products. Here are some of the categories and a sampling of tools that you might use in each:

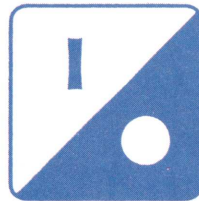
Knowledge Resource Management:	gopher, World Wide Web, pltools
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Configuration Management:	imake, ease, doc & dig (DNS tools),
Perl	scripts
Security Management:	COPS, TripWire, Crack, sudo
Performance Management:	top, nfsstones, xnetload, xperfmon
Storage Management:	nfswatch
Operations Management:	xmailtool, xcoloredit, editres

I am coming to the conclusion that if I am in the mode of searching for tools for the system administrator, than many of you are as well. Judging by many of the comments at the last few conferences, system administration is rapidly becoming a key area of concern.

The role the Interex CSL plays is to ensure that these tools are available to the Interex members at large. Delivering the HP-UX CSL in these days of an exploding information highway becomes more of a scavenger hunt than a serious software development effort. There just is not enough time for us to develop these tools ourselves, so our job is changing to that of implementor and integrator.

You will find some of the tools on previous releases of the CSL; others we will include in future releases as we are able. Also, commercial products starting to appear from both HP and third-party vendors meet some of these needs. Keep an eye on the next release; it will be a significant one. ■

Paul Gerwitz is chairman of the CSL/HP-UX committee and is a system analyst at Eastman Kodak Company in Rochester NY. He can be reached at (716) 477-3067 or by e-mail at gerwitz@interex.org or gerwitz@kodak.com.



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Product Focus

TAE Plus 5.3

HOW MANY GRAPHICAL USER interfaces actually seem as if they were designed for *human* users? If your answer is somewhere in the neighborhood of "very few," it's probably because (1) typical GUI development tools require complex programming in X or Motif, and (2) in the words of Century Computing's Don Link, "programmers are known to be the worst people to design interfaces."

A simple solution is to let users create their usable interface and let programmers create the functional program. Sounds simple, and perhaps a shade idealistic. But those at Century

Computing designed 11 years ago as an interface development tool for NASA researchers, who were using alphanumeric terminals. "Before there was the Macintosh, NASA wanted a consistent look and feel across applications," recalled Link. Now, "well over 900 sites" are using the product in various versions. Century Computing has been involved in developing and improving upon the product from its inception.

With TAE Plus, designers construct an interface out of building blocks called "presentation types." These elements correspond to Motif widgets, such as check boxes, radio buttons, scroll bars, icons, etc. Developers can select, resize, and position the presentation types on their display, called a Workbench, and the corresponding code and values are automatically generated in C, C++, or Ada.

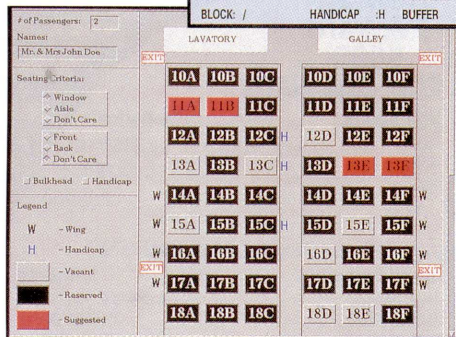
Not all X/Motif widgets are supported, but Link said, "80 percent of them, most people don't ever fool with. We focus on the 20 percent that provide the functionality." TAE Plus features 35 presentation types to perform Motif-like functions; these 35 elements replace hundreds of Motif functions, said Link.

In addition to the presentation types, TAE Plus provides graphic representations of real-time data through Dynamic Data Objects (DDOs). These dials, gauges, pictures, maps, switches, icons, and animated elements don't just present changing data; they can be manipulated to enter data or control the application. Link noted that such graphic presentation and control of real-time data are unique: "We're the only one that allows you to create these freely," he declared.

TAE Plus's Code Merge facility bridges the gap between the interface and application. It is designed to easily integrate user interface code with application code when an element is added to the user's

Typical airline reservation screen

	A	B	C	D	E	F
9X	/B	B	**	/B	/B	X
10X	/	/	/	**	/	X
11M	.	.	H	**	.	.
12M	.	/	H	**	/	.
13M	.	/	.	**	/	.
14M	.	.	.	**	/	E
15M	.	.	H	**	.	W
16M	.	.	.	**	/	E
17X	/	/	/	**	/	XW
18X	.	/	.	**	/	XW
19W	.	.	H	**	E	W
20W	E	W
AVAIL: SEAT LETTER LEAST PREF :J SMOKING :B BULKHEAD :B						
TAKEN: . UPPER DECK :J NOSMOKE :W WING :W						
BLOCK: / HANDICAP :H BUFFER :J EXIT :X						



Screen designed with TAE Plus— with no programming

Computing believe they have turned their vision of a non-programmer's GUI developer into a reality with TAE Plus Version 5.3. This is the first commercial release of the Transportable Application Environment, which is designed to supply both development tools for creating GUIs and management tools for controlling the application's user interface at runtime.

According to Link, Director of User Interface Products and Services, TAE Plus is different from the other CASE tools on the market because, "philosophically, the tool has always been, from its inception, designed to be used by non-programmers." The product does not require the designer to program in X or Motif, so graphic artists, human factors specialists, and end users can create interfaces. It was originally

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product focus

display. Consequently, changes to fonts, colors, placement, size, alignment, text labels, text for menu bar options, and online help text can be made without changing the application code or recompiling or linking the program. The separation of interface designing and application programming is intended to "allow the designer to not have to know the details," Link said.

Many designers have found Code Merge helps bring end users into the design process. "Some customers will sit down with the end user, with a prototype, and make changes right there on the spot," he said. Developers also are able to include users in iterative development and usability tests with this feature.

An automated scripting facility, which employs a language based on perl, also

makes usability testing easy, said Link. With a Record and Playback feature, the developer can capture user actions in a time-stamped log file and then play back the file to observe in detail the user's interaction with the interface. The developer also can construct interface scripts that provide repeatable tests. These scripts allow for automated testing, online demos, tutorials, and usability testing.

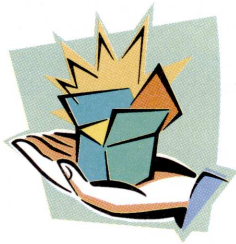
Because TAE Plus uses the shared libraries of X and Motif, it does not increase the application's memory requirement by much, Link assured. "Most of work is being done underneath us—X and Motif are really doing the most (code generating)," he explained. TAE Plus also allows users to generate OSF's User Interface Language (UIL) and Resource Manager (Mrm). These

options call upon the standard X and Motif libraries exclusively, which means the TAE Plus runtime libraries are taking no memory at all, he added.

Pricing for TAE Plus Version 5.3 is based on the number of TAE developers in a work group, with licenses for 1 to 15 developers ranging from \$2,250 to \$11,200. Prices are discounted for work groups of more than 15 developers.

Contact Century Computing Incorporated, 1014 West St., Laurel, Maryland 20707, phone: (301) 953-3330 or (800) 823-3228. ■

Michelle Pollace is the New Products editor for hp-ux/usr.

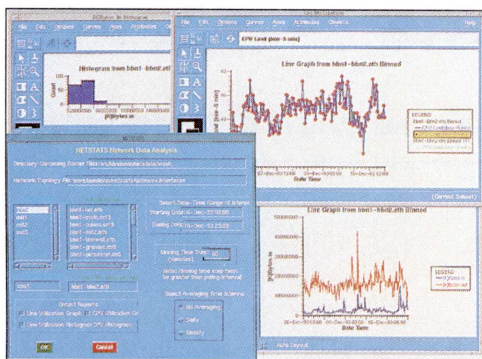


New Products

Customized Data Analysis

BBN Software Products Corporation has announced BBN/Cornerstone Extension Language (CEL), an object-oriented programming language that includes a library of classes and is designed to let both application developers and end users customize and adapt BBN/Cornerstone data analysis software.

Based on C++, CEL shelters users from many of the intricacies of the language by adding online help and visual programming tools. CEL developers find that repetitive programming tasks are greatly reduced and solutions are easy to maintain, BBN notes.



BBN CEL

CEL's GUI toolkit enables developers to create and manage BBN/Cornerstone's look and feel. Application developers can visually design their own dialogue boxes, windows, and menus. CEL's object browser provides point-and-click access to online information about object classes and interactive access to method definitions. CEL also features a multi-pane debugger. Cornerstone Workmap diagrams that automatically record each step in the analysis process can be extended with CEL to produce reusable routines and automated, batch-style operations.

CEL is a separately priced option to BBN/Cornerstone Release 1.1 and can be purchased for \$995 (fixed license) or \$1,995 (floating license). Applications developed in CEL will run on any client with BBN/Cornerstone Release 1.1 software installed. BBN/Cornerstone and

CEL run under HP-UX and other UNIX-based systems.

Contact BBN Software Products, 150 CambridgePark Drive, Cambridge, Massachusetts 02140, phone: (617) 873-5000.

Motif Made Simple

TEAMWORK Software Solutions has announced Motif Made Simple (MMS) Version 1.0, designed for generating Motif X window system-based applications without the use of Motif and X window programming concepts and libraries.

MMS is a library of C program routines designed to shorten development cycles. Now a programmer with basic C programming skills and basic experience with a windowing environment (X, Windows, Macintosh) can develop sophisticated X window applications with minimal effort, the company notes.

Motif Made Simple is currently available in object library and source code form for the HP 9000 and Sun Sparc platforms and in source code form for other platforms. Licensing options range from \$89 for an object library use license on one CPU to \$5,795 for a source code use and application distribution license for an entire site. Object licenses include one set of media, documentation, demonstration programs, and 60 days of support. Source code licenses include media, documentation, demonstration programs, and 90 days of support.

Contact TEAMWORK Software Solutions, 572 E. 126th Terrace, Suite 1B, Olathe, Kansas 66061, phone: (913) 829-5128.

Electronic Forms

Xpoint Canada has announced REFORM, electronic-forms and

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All others:
IEM International Sales
1629 Blue Spruce Drive
Fort Collins, CO 80524 USA
Phone: +[1] 303-221-3005
Fax: +[1] 303-221-1909



Windows-to-UNIX Development

MainSoft Corporation has announced added support for the Microsoft Foundation Class (MFC) Library and applications developed using Visual C++ to its MainWin Cross-Development Kit (CDK). MainWin is designed to provide easy, fast conversion of Windows applications to UNIX while maintaining the original application's look and feel, or, at the end user's option, providing the Motif look.

The MainWin CDK now ports applications that use Visual C++ and are written with MFC to UNIX. MFC's high-level object library simplifies the Windows API by providing an object interface, enables object-oriented (C++) techniques, and provides a degree of portability from 16- to 32-bit versions of Windows. MainSoft Tools are designed to enable Visual C++ code to be deployed on HP workstations, X Terminals, and other systems.

The MainWin technology enables developers to maintain the look and feel of the original Windows application and does not alter its underlying code, the company notes. MainWin CDK is priced at \$5,000 for one workstation unit and \$2,000 for each additional unit purchased. An end-user environment is available for \$199 per user.

Contact MainSoft Corporation, 883 N. Shoreline Blvd., Suite C-100, Mountain View, California 94043, phone: (415) 966-0600, fax: (415) 966-0613.

barcode-labeling software developed for UNIX-based systems.

The product is designed to enable custom designing and printing of forms and labels to reduce the need for pre-printed documents, merging application data with electronic forms stored in a forms library, electronically distributing forms, and creating multi-part forms with laser-printed quality.

In addition, REFORM creates barcodes for forms and labels, supporting the industry's most popular styles. The product is designed to provide flexible barcode specifications.

REFORM provides support for all major UNIX platforms, including HP-UX. It is available now, ranging from \$695 to \$2,495. REFORM also supports most application and database management software systems on the market,

the company notes.

Contact Xpoint Corporation, 3100 Medlock Bridge Road, Suite 370, Norcross, Georgia 30071, phone: (404) 446-4493, fax: (404) 446-6129.

SVGA for BASIC Workstations

Stellingwerff Beintema B.V. has developed a new, high-resolution SVGA graphics interface for the HP 9000 Series 200 and 300 BASIC workstations. The SB-SVGA interface offers an alternative for the existing but obsolete HP RGB interface, a resolution of 1,024 x 768, support under HP BASIC 6.2 and higher, operation with Newport Digital's Turbo card, full compatibility with HP 98627A, SVGA compatibility for use of lower cost color displays, color-mapped mode support, and increased speed over the existing product.

The new interface can be used by the thousands of users of HP BASIC workstations who require higher graphics resolutions than currently possible.

The cost of the SB-SVGA interface is NLG 1.850, excluding VAT.

Contact Stellingwerff Beintema B.V., Zijlweg 144, 2015 BH Haarlem, The Netherlands, phone: +31 (23) 314192, fax: +31 (23) 325993.

On-Site Network Maintenance

ManTech Systems Corporation has announced an independent service division dedicated to on-site, multi-vendor maintenance and repair services for commercial network users. The Services Division of ManTech Systems Corporation is headquartered in Columbia, Maryland; the first regional office is located in San Diego, California. ManTech International, headquartered in Fairfax, Virginia, employs 3,500 people in more than 80 offices worldwide.

ManTech Systems will provide each customer with a field engineer personally responsible for the quality of service. Factory-trained, field-tested engineers are equipped with their own computers. Test equipment and tool kits ensure minimum downtime for the customer. All parts, modules, and systems are stocked locally, including hard-to-find parts such as HP 9000 CPUs.

Contact ManTech Systems Corporation, 4370 La Jolla Village Drive, Suite 400, San Diego, California 92122, phone: (619) 546-4885, fax: (619) 546-9227.

New from WRQ

PC X Server with Dial-in

Reflection X from Walker Richer & Quinn (WRQ), Inc. will include remote dial-in capabilities in a release due to

ship mid-1994. WRQ has licensed Serial Xpress from Tektronix, Inc., and will incorporate that technology into Reflection X, a 32-bit Microsoft Windows-based PC X server. Serial Xpress is a protocol that uses data compression to achieve high speeds over direct or phone-line connections. With this capability in Reflection X, users will have access to X applications from their home computers, laptops, and notebooks.

The serial link in Reflection X will be available at no extra charge. Update pricing of Reflection X is \$100. Customers can also trade in competing X servers and receive the updated version of Reflection X for \$100.

For new X server customers, Reflection X is available in a stand-alone version (\$469) or bundled with WRQ's own TCP/IP stack and with Reflection 2 for Windows (the Reflection X Connectivity Suite) for \$599. Update or competitor's trade-in pricing for the Reflection X Connectivity Suite is \$200.

Mainframe Connection

WRQ also has announced Reflection 3270 for Windows, PC connectivity software designed to merge TCP/IP-based LAN internetworks with IBM mainframes. Reflection 3270 provides Reflection for Windows connectivity to UNIX, VAX, HP, and IBM enterprise systems—more environments than any other single software company, WRQ notes. Reflection 3270 is engineered to grow with organizations as they move from legacy applications to client-server computing. The product is designed to provide easy-to-use 3270 emulation, command-driven architecture, powerful API support, and an integrated scripting language.

Reflection 3270 is said to be the


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Bundled Productivity Tools

Island Software Corporation has announced IslandOffice, which includes the latest versions of Island Write, Draw & Paint, IslandPresents, and IslandCalc. At a list price of \$1,695, IslandOffice offers a savings of \$790 off the price of purchasing each Island product separately. IslandOffice is currently available for HP 9000 Series 700 workstations and Sparc workstations running Motif.

IslandOffice contains Island Write, Draw & Paint (Version 4.1), which includes IslandTable, a table editor, and IslandEquation, an equation editor. Version 4.1 provides all of the new and enhanced word processing, desktop publishing, table, and equation features found in IslandWrite 4.0.

IslandPresents lets users create presentations that include text, data, and graphics from other UNIX applications. Version 1.1 also includes IslandTable, IslandPaint, and IslandChart and contains over 100 professionally designed vertical and horizontal templates. It includes IslandSound, a graphical sound editor, and IslandShow, which displays IslandPresents presentations on-screen without requiring the full IslandPresents program.

IslandCalc features optional front ends to Ingres and Oracle databases, letting users extract selected data into a worksheet by forming industry-standard SQL queries with the click of a mouse. Users can also use IslandCalc as a database data-entry tool. IslandCalc can be launched from IslandWrite.

IslandOffice is available for \$1,695 (list). Separately, Island Write, Draw & Paint is \$995, IslandPresents is \$995, and IslandCalc is \$495.

Contact Island Software Corporation, 4000 Civic Center Drive, San Rafael, California 94903-4178, phone: (415) 491-1000, fax: (415) 472-0335.

only full-featured TN3270 product available to the estimated 20 percent of LAN-connected PCs wanting access to mainframes over TCP/IP. The package includes built-in Telnet support that will run over Windows Sockets-compliant and other types of TCP stacks. WRQ also offers its own TCP stack as an option. Reflection 3270 is priced at \$299 per single copy. Site licenses start at 25 copies for \$195 per copy. Multiple-copy discounts and server versions (for concurrent use) are available.

Contact Walker Richer & Quinn, Inc., 2815 Eastlake Ave. East, Seattle,

Washington 98102, phone: (206) 726-7368, fax: (206) 322-8151.

Load Balancing

Unison-Tymmlabs has announced the acquisition of Load Balancer from Freedman Sharp and Associates of Calgary, Alberta. The product has already sold more than 3,000 copies since it became available less than a year ago, the company notes.

Load Balancer is designed to provide automatic queuing and distribution of jobs across heterogeneous UNIX networks, improving network performance and throughput by

putting idle computers to work and reducing the load on busy ones. The product is designed to be transparent to users and require no modifications to applications. The product is priced between \$425 and \$895, depending on system configuration.

Contact Unison-Tymmlabs, 675 Alamanor Avenue, Sunnyvale, California 94086, phone: (408) 245-3000, fax: (408) 245-1412, e-mail: info@unison.com.

Automated Power Control

Texas ISA, Inc. has announced the ISA Model 7020 Startup/Shutdown Control Device, designed to control the power of UNIX systems. The Model 7020 has been available in Japan for two years and is now available worldwide. It follows the Model 7010, which contains an HP-IB interface.

The 7020 is designed to provide programmable control of the power and startup/shutdown of UNIX systems and external peripherals within the most complex heterogeneous networks. The device occupies a user terminal line, just like all other active terminals on the system. Any remote switch, internal calendar clock, or UPS power-fail signal developed into the 7020 can trigger the unit to log into the system and initiate the startup/shutdown process.

Upon the positive detection of any one of the sources, the 7020 will automatically log into its account on the system. After it receives confirmation from the system that the startup/shutdown process has been successfully launched, the ISA unit will wait for a user-specified period before turning on or off the AC power outlets.

The ISA Model 7020 is configured with two pairs of AC outlets, an RS-232C port, remote switch, and utility software

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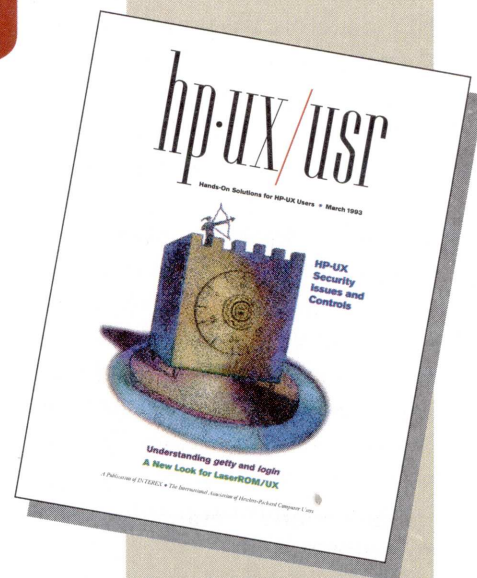
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compatible with HP 9000s and other UNIX platforms. It is priced at \$995.

Contact Texas ISA, Inc., 14825 St. Mary's Lane, Suite 120, Houston, Texas 77079, phone: (713) 493-5746, fax: (713) 493-2724.

FORTRAN Program Analysis

Software Systems Design has announced Version 1.5 of FREDoc, FORTRAN Reverse Engineering and Documentation tools. The set of tools provides the capability to reverse engineer existing FORTRAN code to see the underlying design. FREDoc's DocGen/FTN tool can generate DoD-Std-2167A documentation to describe the system automatically.

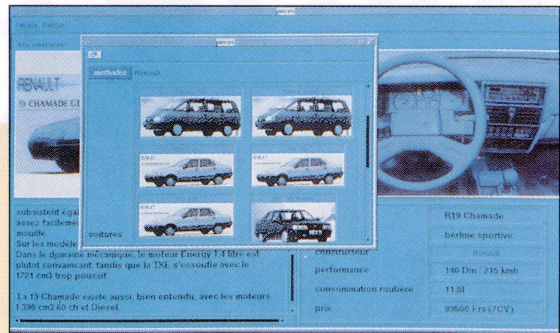
FREDoc provides top-level and detailed system viewing and can analyze any existing FORTRAN program to provide the designer with either a "macro" view (an understanding of the interaction between the program modules) or a "micro" view (a detailed analysis of each of the components of the design). Point-and-click features enable users to expand any view or to examine the location of calls to or by any routine. The graphical interface is based on X11/Motif.

FREDoc's AutoHeader program is designed to automatically prepare comments containing relevant information (such as inputs, outputs, calls, called-by, global/common data used) and place those comments in the source file. Rerunning AutoHeader automatically will update the header comments after code changes, the company notes. Pricing ranges from \$4,000 to \$7,000.

FREDoc is available on HP workstations and other platforms.

Contact Dr. Thomas S. Radi, Software Systems Design, 3627 Padua Avenue, Claremont, California 91711, phone: (909) 625-6147, fax: (909) 626-9667.

O₂ Object-Oriented Database Management System



Object-Oriented Database Management

O₂ Technology has announced the O₂ object-oriented database management system, designed to simplify the design, testing, and maintenance of complex database applications, particularly projects with large amounts of data and diverse information types.

The system can be programmed in either C or C++ and runs on UNIX workstations from HP and other vendors. O₂ communicates with existing applications and integrates with software packages for tasks such as CASE, application development, and user interfaces, the company notes.

The package includes three modules: an object database engine, a complete development environment, and a set of graphic interface tools. O₂ Engine handles the storage, distribution, and sharing of object-oriented data. Its development environment includes O₂C, O₂SQL, and an O₂Look graphic interface meeting X and Motif standards. O₂Tools graphic programming package has graphic editors, a cross-reference manager, an incremental compiler, an object symbol debugger, and automatic compiling tools.

The object-oriented data model in O₂ supports features for complex objects with identity, classes, types, encapsulation, methods, multiple inheritance, and the overriding and late binding of methods. Multiple types of data for text, programs, images, and sound are said to be easily managed. Data distribution is fully transparent, the company notes.

Pricing is based on number of concurrent users. Developer's licenses range from \$3,500 to \$7,000, depending on options chosen. Runtime and site licenses are available.

Contact Doug Little, O₂ Technology, 2685 Marine Way, Suite 1220, Mountain View, California 94043, phone: (415) 969-2333, or Ms. Helene Gans, O₂ Technology, 7, rue de Parc de Clagny, 78035 Versailles Cedex, France, phone: 30 84 77 77, fax: 30 84 77 90.

Automated Program Interaction

Herstal Automation, Ltd. has announced AUTOREPLY, designed to enable operators to pre-program responses to HP program interactive messages, eliminating the need for constant operator surveillance.

AUTOREPLY receives program tty output, interprets it, and responds with

actions and functions pre-defined by the operator. The operator can specify predetermined responses to some program messages and handle others manually. All program activity, automated or manual, appears on the operator's terminal, the company notes.

Herstal's AUTOCHANGER software and hardware are designed to enable

Automated Development

API International has announced a new version of Faces, its Windows design tool for automatically building Windows screens from database tables on HP 9000s. Now Faces can automate migration to client-server environments. Applications built with Faces run on PCs and can use their own ODBC-compliant database. Faces applications can use data stored in HP-UX databases such as Oracle or Sybase or can use the included database.

On a PC, developers can build a database or a Windows interface to an HP-UX database. The product also attaches directly to databases on both hosts and clients. It connects to data stored in an ODBC-compatible database on any HP-

UX system, including Oracle, Sybase, and Informix. The automatic screen builder will build interfaces from these data structures or give developers the option of adding fields from those databases to an existing Faces front-end interface, the company notes. An included DBQUERY tool is designed to let developers create SQL queries to the database from a point-and-click interface. Ready-to-use buttons and objects include add, modify, delete, next, previous, and first and last record. Developers can easily add buttons to do searches for records, the company notes.

Other enhancements include three-dimensional screen objects, additional

tools, and a 60-percent performance improvement across all modules. Faces is sold as a developer's suite with low-cost runtime modules for each client. Developers versions cost \$995, and runtime versions are priced at an average of \$130 a copy. Site licensing and multiple-copy pricing are available, as are demonstration copies.

Contact API International, P.O. Box 91027, Austin, Texas 78709, phone: (512) 280-4391, fax: (512) 280-0309.

API Faces

The screenshot shows a Windows-style application window titled "FACES". It has a menu bar with "File", "Edit", "Quick Edit", "Other Areas", "Mode", and "Help". Below the menu is a header area with fields for "US NUMBER", "Customer ID", and "DATE" (set to 2/9/94). The main area is a form with several sections: "Contact Name" (Connie Wright), "COMPANY" (INTEREX), "TITLE" (Publication Manager), "Type of Business" (Association), "SALUTATION" (Dear Connie), "Phone" ((800) 468-3739), and "FAX" ((408) 747-0947). There is an "ADDRESS" section with a "Status" dropdown set to "Demo". Below this is a "MAILING" section with fields for "CITY" (Sunnyvale), "STATE" (CA), "ZIP" (94088-3459), and "COUNTRY" (USA). At the bottom, there are buttons for "First", "Next", "Previous", "Last", "Add", "Delete", "Update", "New Record", "Clear Screen", "Find First", "Find Next", "Find Last", and "Find Prev". A status bar at the very bottom says "Status Line (default line 24)".

AUTOREPLY to respond to tty output with appropriate instructions. Configured this way, the product is intended to facilitate automated, unattended backup of as much as 96 GB of data. It helps automate other routines, such as monitoring the status of unattended operations and data collection/analysis.

AUTOREPLY is intended to be fully compatible with all interactive software used with HP operating systems. It is priced at \$1,000.

Contact Herstal Automation, Ltd., 3171 West 12 Mile Road, Berkley, Michigan 48072, phone: (810) 548-2001, fax: (810) 548-2010.

Memory Conversion

The Autotime Corporation has announced a new circuit board configuration to provide users a way to salvage old memory and still upgrade the

memory in their computers. The new memory conversion boards allow the user to build a 1-MB memory SIMM module from their old 256-KB memory chips or build a 4-MB memory SIMM module from their old 1-MB chips.

A Customized Logic Chip (PAL) is responsible for the memory decoding that allows the new memory configuration to work.

These memory configuration options support HP 9000 workstations.

Contact Autotime Corporation, 6605 SW Macadam Avenue, Portland, Oregon 97201, phone: (503) 452-8577, fax: (503) 452-8495, AutoFax: (503) 452-0208.

Keyboard and Pointer Converter

Modular Industrial Computers (MIC) has announced its Human Interface Link (HIL)-PS/2 Converter, which is designed

to enable interfacing up to seven PS/2-compatible keyboards or pointers to an HP 9000 Series 300, 400, or 700 workstation. The converter can interface directly into the HIL of an HP workstation or be used in any position on the HIL.

The converter provides 100 percent emulation of the HP model 1429A keyboard and a 100 percent "functional" emulation of the HP model 46021A keyboard, the company notes. It enables workstation users to interface PS/2-compatible devices such as ergonomic keyboards, trackballs, barcode readers, touchscreens, touch pads, and mag strip readers.

The MIC HIL-PS/2 is available as both a board-level product for Original Equipment Manufacturers and as a stand-alone enclosed product for desktop applications. MIC is also an HP VAR that modifies HP X stations, workstations,

Vectras, and peripherals for the factory floor.

Contact Modular Industrial Computers, 6025 Lee Highway, Suite 340, Chattanooga, Tennessee 37421, phone: (615) 499-0700, fax: (615) 892-0000.

EDI Utility

Pro Software, Inc. has announced Pro_EDI for the HP 9000 Series 800. Pro_EDI is an EDI translation and document management utility that also runs on HP 3000 computers.

Pro_EDI is designed to add EDI functionality to any business application. It allows users to design their own application interface files, define transaction sets on a trading partner basis, and control the movement of data between application interface files and EDI files. Users can run the translators as background processes or invoke them from other programs, the company notes. The document manager module tracks document flow through the translation and transmission processes.

Pro_EDI supports ANSI X.12, AIAG, TDCC, UCS, VICS, WINS, other North American public standards, and UN/EDIFACT. It is priced at \$13,800, regardless of CPU size.

Contact Tom Brandt or Randall Smith, Pro Software, Inc., Suite 240, 725 Barclay Circle, Rochester Hills, Michigan 48307, phone: (810) 299-0020, fax: (810) 853-2442.

C and C++ Development

Lucid, Inc. has announced that HP is co-funding the port of Energize Programming System to the HP 9000 Series 700. Energize for HP will be integrated within the Softbench framework

Electronic Messaging

Z-Code Software Corporation has announced Z-Mail 3.0, the next generation of the existing Z-Mail product, Version 2.1. Z-Mail 3.0 extends the intuitive, fully-configurable user interface, a rules-based e-mail engine, and a fully extensible scripting language for customizing the feel and features of user and system administrator mail environments. It also offers new core functions, additions to the scripting language, enhancements to the user interface, and improved handling of large volumes of mail.

Z-mail 3.0 offers directory service access designed to allow the system administrator to link Z-Mail into most directory service programs already in place. If no directory exists, Z-Mail provides the capability to build one.

Z-Mail 3.0 supports the Multipart Internet Mail Extensions (MIME) standard message format, which enables multimedia document handling with all non-proprietary mail systems. Z-Mail's older attachment format, which predated the MIME standard, will still be recognized by generation 3.0. Z-Mail's help system has been reorganized to enable users to obtain easily information on a particular function. The hypertext help system allows users to search the text for any phrase within an online document. Other improvements include localization for international languages, optional post office protocol (POP3) support, Motif 1.2 support, improved license server speed and reliability, configurable toolbox, headers and interposers, and new dialogue for easier interface customization.

Z-Mail Version 3.0 operates on HP 9000s running HP-UX and on other platforms. A one-user license costs \$295. A 10-user license costs \$2,495. A 100-user license is \$150 per user, and a 500-user license is \$125 per user.

Contact Z-Code, 4340 Redwood Highway, Suite B-50, San Rafael, California 94903, phone: (415) 499-8649, fax: (415) 479-0448.

to facilitate inter-tool communication when shipped early in the fourth quarter of 1994.

Energize is an environment for C and C++ development that offers integrations with leading configuration management systems, GUI builders and toolkits, and utilities in order to shorten application development cycles. Energize users estimate that their schedules are up to 25 to 50 percent shorter, the company notes.

Energize is said to offer benefits not available with HP's C++ Softbench product: it supports automatic and incremental tool updating as well as incremental linking. The software also is designed to spread workloads across the

network to reduce resource bottlenecks.

Lucid is preparing to release a version of Energize that provides international character support. This work is being done in partnership with INS, a subsidiary of Nippon Telegraph and Telephone and Lucid's exclusive distributor for Energize in Japan. With Hewlett-Packard and INS, Lucid intends to deliver early in the fourth quarter of 1994.

Energize is priced at \$4,250 for a single unit and \$2,900 per unit for 10 units. Site licenses and educational discounts are available. Lucid offers customer support for all products.

Contact Lucid, Inc., 707 Laurel Street, Menlo Park, California 94025, phone: (415) 329-8400, fax: (415) 329-8480.

PLAN-B

If there is one thing you can count on, it's that users do not back up their PCs. They forget, don't have time, run out of diskettes, or simply don't know how important backups are. What else can you count on? **Plan-B.**

Plan-B is a host-based client/server backup solution for networked PCs and servers connected to an HP9000 host computer. PCs can be in most any state: as long as they are powered up, they will be backed up.

Plan-B backs up PC data to HP9000 disk files, which are then stored with the normal host system backup. This provides consistency and data integrity between the clients, server, and host—a fundamental requirement for proper backup of a client/server environment. Alternately, PCs may be backed up through the host directly to tape.

Backups are centrally configured on and initiated automatically by the HP9000; restores are initiated by the PC user. This minimizes or eliminates operator intervention for backup and restore and guarantees that PCs are backed up on a regular basis. **Plan-B** keeps backup control in Data Processing where it belongs: not in the users' hands.

Whether you're looking for a high-performance backup solution for your client/server environment or just a better way to back up your PCs, **Plan-B** is the answer.

Plan-B is a copyrighted product of System Consultants

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Workflow Management

Wang has announced OPEN/workflow software, designed to enable users to organize, automate, manage, and fully integrate work processes with existing PC, LAN, UNIX, and legacy applications.

The OPEN/workflow Builder is intended for graphically building comprehensive workflows of automated and manual work activities. It also enables process evaluation prior to implementation.

Wang's OPEN/workflow Toolkit integrates with several platforms, accommodates a broad range of development tools, and includes ODBC integration with various SQL database engines. Users can employ familiar applications and environments without importing files into the system.

OPEN/workflow features pre-coded business metrics to monitor and measure work processes. Flexible, easy-to-understand metrics are accessible through industry-standard Windows-based tools. Sample reports, queries for metrics, and procedures for typical applications are also included. Changes to applications can be managed without redesigning workflow procedures. In addition, users can change processes without changing applications or using the applications' development tools.

OPEN/workflow is available on HP-UX. OPEN/workflow server pricing begins at \$7,500 and includes OPEN/workflow graphical builder, integration tools, reporting tools, and sample reports and procedures. OPEN/workflow clients start at \$495 per user with volume discounts available.

Contact Wang, One Industrial Avenue, Lowell, Massachusetts 01851, phone: (508) 459-5000, fax: (508) 967-4152.

Document Management

Documentum Inc. has announced its Enterprise Document Management System client-server software. The Documentum system scales from departments to distributed enterprise-wide networks and consists of the Documentum Server, Documentum Workspace clients, and the Documentum Toolkit.

The Documentum Server, an object-oriented application, resides on a UNIX server and stores library services, workflow management, dynamic document assembly, and application development tools.

The Documentum Workspace is a graphical user environment that runs

in native mode under Microsoft Windows, Apple Macintosh, and UNIX/Motif. The Documentum Workspace supports application integration techniques to popular desktop applications and supports desktop messaging standards such as DDE, Apple Events, and UNIX ToolTalk.

The Documentum Toolkit, for building interfaces and applications, is a set of high-level APIs that support professional programming languages and application development tools. Automation technologies include those for library services, workflow management, and dynamic document assembly.

The Documentum System Version 1.1 supports Windows, Macintosh, and

Motif clients and HP-UX servers and others. A typical Documentum pilot system is approximately \$50,000 to \$80,000, based on a minimum of 32 users. Discounts are available.

Contact Documentum, 4683 Chabot Drive, Suite 102, Pleasanton, California 94588-2748, phone: (510) 463-6800, fax: (510) 463-6850.

New from IEM

Write-Once Support for Optical Drives

IEM, Inc. has announced what are said to be the first software utilities providing write-once capability of SCSI multi-function optical drives. The utilities are available for HP 9000 Series 300, 400, 700, and 800 systems under HP-UX.

The filing systems currently available on HP computers maintain directories by rewriting the sectors containing the directory information each time a file is added, removed, modified, or renamed. Such directory maintenance is impossible with write-once media, as it is impossible to rewrite any sectors once they have been written.

IEM's software utilities are designed to circumvent this problem. By providing their own directory maintenance scheme, these utilities allow users to store, list, and restore files on write-once optical disk cartridges. The software also provides fast file access the ability to store multiple archives on a single cartridge, and data portability between different HP machines with HP-IB or SCSI interfaces.

Once written, data cannot be erased or overwritten, either accidentally or intentionally, notes IEM. Adding to the security of information stored, each cartridge has a minimum archival life of 10 years.

Utilities are also available for HP-IB

WORM or multi-function drives on HP 1000s, HP 3000s, and HP 9000s.

DDS-2 DAT Drives

IEM has announced a new line of 4-mm DAT drives and autofeeders using the new DDS-2 technology. With an uncompressed capacity of 4 GB per tape and a transfer rate of 510 KB/second, these products give users roughly twice the capacity and three times the speed of DDS-1 drives.

At a typical 2:1 compression ratio, the effective tape capacity is 8 GB, and the effective transfer rate becomes 1 MB/second. Higher compression ratios will yield greater capacities and faster effective transfer rates.

The DDS-2 drives and autofeeders are fully read/write compatible with 60m and 90m DDS-1 tapes, both compressed and uncompressed. The 120m tapes will be written in the DDS-2 format, and cannot be read or written on older DDS-1 drives.

DDS-2 technology is available from IEM in stand-alone drives, 6- and 12-tape autofeeders, and 20- to 60-tape carousels. Each is supported on either single-ended SCSI-2 or differential SCSI interfaces. These products are compatible with HP 1000, 3000, and 9000 computers with SCSI interfaces. Media tapes and cleaning cartridges are also available.

Half-inch 3480 Drives

IEM has announced half-inch 3480-compatible tape drives with attached 10-tape autoloaders, designed to offer fast backups and easy data interchange with HP and non-HP machines under UNIX. These single-ended SCSI drives feature a 3 MB/second data transfer rate.

All models feature built-in data compression with an average compression

ratio of 3 to 1. The compression algorithm used (1CRC) is fully compatible with the industry-standard IDRC algorithm.

The 3480 products are supported on HP 9000 Series 800s (HP-UX 9.04 or later), HP 9000 Series 700s (HP-UX 8.07 or later), and HP 3000 Series 900s (MPE/iX 4.0 or later). All models can be covered by an on-site service contract from Hewlett-Packard.

DDS-2 Carousels

IEM, Inc. has announced a new line of 4-mm tape carousel libraries with built-in data compression. These carousels incorporate the new DDS-2 technology for greater storage capacities and faster access times.

DDS-2 drives use 120m tapes with a 4 GB uncompressed capacity. Transfer rates for DDS-2 drives are 510 KB/sec uncompressed (compared with 183 KB/sec for DDS-1). With built-in data compression and a 2 to 1 compression ratio, the effective capacity is 8 GB, and effective transfer rate is 1 MB/sec.

The DDS-2 drives are fully read/write compatible with 60m and 90m DDS-1 tapes, both compressed and uncompressed. The 120m tapes will be written in the DDS-2 format and cannot be read or written on older DSS-1 drives.

These carousels are available with one, two, or four internal tape drives and with a capacity for 20, 40, or 60 tapes. All units are also available with a barcode reader and designed for expandability. All models include a touch-screen LCD control panel. Additional options include SCSI differential bus support and the availability of desktop (horizontal or vertical) or rack-mountable versions.

The 4-mm carousels are available for HP 9000s with SCSI interfaces and offer

full compatibility with HP 9000 Series 300, 400, and 700 using HP-UX 8.0 and above and with Series 800 using HP-UX 9.04 and above.

Removable Hard Disk Drives

IEM, Inc. has announced the release of removable hard disk drives, designed to offer portability and expandable capacity without sacrificing speed and performance. The drives are available as single or dual 105-MB removable drives. The single removable disk drive can be combined with a built-in 270- or 525-MB fixed hard disk drive and/or a 3.5-inch floppy disk drive.

The removable drives, which use SyQuest drive mechanisms and media, have an average access time of 14.5 msec, IEM notes.

The lightweight, compact media cartridges can be removed for secure storage, transportation, or data sharing. Each cartridge has a capacity of 105 MB; more disk space can be added with additional cartridges.

The drives attach via an HP-IB interface and are compatible with HP 9000 computers running HP BASIC (RMB), HP-UX, or Pascal, and with HP 1000 computers running RTE-A. The drives are covered by a one-year, next-day replacement warranty.

Automated Backup

IEM, Inc. has announced Alexandria Version 2.0, a comprehensive software package designed to fully automate the backup task on UNIX systems. Alexandria is designed to implement and supervise every facet of a network's backup plan. This includes automatically starting scheduled full and incremental backups, rescheduling failed backups, managing media and storage devices,



Mega Drive Systems MK/10

New from Mega Drive

Rack Mounting Array

Mega Drive Systems, Inc. has announced the MK/5 RAID Disk Arrays, which incorporate a rigid backplane for rack-mounted environments. The arrays support RAID Levels 0, 3, and 5 and use a Fast and Wide SCSI-2 interface. The units provide up to 10 GB of fault-tolerant mass storage.

Mega Drive's new MK/5 control panel also features a push-button programmable array monitored with an LCD screen. With a graphical user interface for continual system monitoring, it is designed to allow the user to configure the unit and monitor the status of drives, power supplies, fans, and components. On-screen programming is intended to provide user control of functions such as execution of built-in diagnostics or on-the-fly reconstruction of drives.

The five-drive MK/5 array uses Mega Drive's Mercury Removable Hard Drive System to provide reliable hot swapping. The array can be configured from 2.1 GB to 10 GB using any of the fully enclosed, shock-mounted, Mercury

Drive Modules from 535 MB to 2.1 GB. Up to 128 MB can be added to the MK/5 on-board cache.

The unit's redundant architecture supports hot-swappable power supplies, fans, and RAID controllers for added fault tolerance. The MK/5 can also be equipped with a tape backup system and a pager alert module.

The suggested price of the Mega Drive MK/5 starts at \$10,360 and varies depending on storage configuration and optional equipment.

RAID Disk Arrays

Mega Drive Systems, Inc. has announced MR/10 RAID Disk Arrays, offering a new double-wide rigid backplane that can accept up to 10 removable disk drive modules. The array offers capacities up to 20 GB and supports RAID Levels 0, 3, and 5. The units use a Fast and Wide SCSI-2 interface and

provide fault-tolerant mass storage for PC, LAN, Mac, and workstation environments.

Like the MK/5, the MR/10 also incorporates an extensive push-button programmable array monitored via an LCD screen; a graphical user interface for continual system monitoring; a removable hard drive; support for hot-swappable power supplies, fans, and RAID controllers for added fault tolerance; and support for a tape backup system and a pager alert module.

The arrays can be half-populated with one rank of five drives or fully populated with two ranks of five drives each (10 drives). This yields from 2.6 to 20 GB of storage using any of the fully enclosed, shock-mounted, Mercury Drive Modules from 535 MB to 2.1 GB. Up to 128 MB can be added to the MR/10 on-board cache.

The price of Mega Drive MR/10 starts at \$14,360 and varies depending on storage configuration and optional equipment.

Contact Mega Drive Systems, Inc., 489 S. Robertson Blvd., Beverly Hills, California 90211, phone: (310) 247-0006, fax: (310) 247-8118.

tracking device usage, and scheduling cleanings.

Version 2.0 features system load balancing, increases in performance, new scheduling and command line options, and online database backups. Version 2.0 has also added support for new libraries, including 3480 tape, and DAT libraries with internal DDS-2 tape drives. Devices already supported include 4-mm (DDS-1) and 8-mm tape libraries and rewritable optical disk jukeboxes. Pull-down graphics and menus using the

X11/Motif interface and a command-line interface are provided.

Access to Alexandria operations can be restricted by user group, and Alexandria offers methods for restricting access to different machines on the network. Alexandria's optional proprietary storage format provides additional security, and files also can be stored using *tar*, *cpio*, or any user-defined format.

Alexandria accommodates HP 9000 SCSI workstations and file servers and other platforms.

Contact IEM, Inc., 1629 Blue Spruce Drive, Fort Collins, Colorado 80524, phone: (303) 221-3005, Fax: (303) 221-1909, or IEM Europe, Ltd., phone: (44) 0608 645000, fax: (44) 0608 645155.

Font Management

Gallium Software Inc. has introduced new font-management products designed to bring Macintosh and PC font capabilities to the UNIX desktop. The Gallium Fontastic products provide the ability to rasterize TrueType, Type 1, and SPEEDO



WHAT'S

JMS/UX & CALLBACK/UX *Batch job scheduling and system monitoring for UNIX.*

Two of the leading data center management tools that previously were only available for MPE are now available for UNIX. Both use sophisticated X-Window functionality and appearance on standard ASCII terminals.

CALLBACK/UX - A combination of hardware and software to monitor your Unix system. For any event, you may be notified by pager or by a voice phone message. Use your own recorded messages or any of the pre-recorded default messages.

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- Stdout/stderr scan

Additional new features:

- Dialback capability to control multiple modem ports.
- Remote system console support.
- Monitor multiple Novell servers.

JMS/UX - An easy-to-use software tool that lets you control batch job scheduling on HP/UX. Like the MPE version, jobs can have flexible scheduling; job dependencies across systems; multiple queues; execution restrictions; job tracking; automated recovery; audit history; and no schedule definition language to learn. The scheduling capability of the Unix commands 'at' and 'batch' have been implemented.

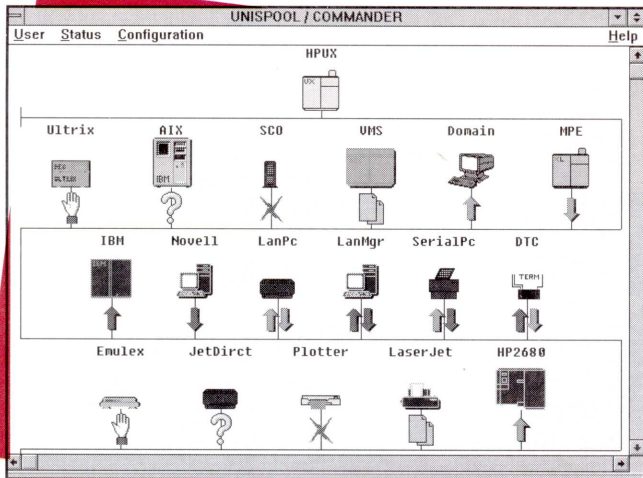
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CIRCLE 114 ON READER SERVICE CARD

new products

Desktop Label Printer

CoStar Corporation has announced the LabelWriter SE, said to be the first desktop label printer that requires no special software and includes built-in fonts and bar codes.

The LabelWriter SE has eight built-in fonts and six barcode symbologies and prints at a rate of nearly two inches per second on thermal paper or labels. Text and bar codes can be mixed in various sizes and orientations on the same label.

Other features of the LabelWriter SE include a 2.25-inch wide thermal print head, 138-dpi resolution, and the ability to handle thermal labels and paper. Printer emulation is a subset of the Epson FX command set, so it accepts bitmap data for printing graphics (Epson commands) and supports downloadable ASCII characters.

The LabelWriter SE uses an RS-232 serial interface, and a serial cable is provided. It carries a suggested retail price of \$499 and is available from resellers nationwide and directly from CoStar. A one-year warranty is included.

Contact CoStar Corporation, 100 Field Point Road, Greenwich, Connecticut 06830-6406, phone: (203) 661-9700, fax: (203) 661-1540.

formatted fonts on all UNIX platforms.

The Gallium Font Server and API are intended to allow end users to buy off-the-shelf font packs for their UNIX workstations, and the Font Manager allows users to configure these fonts on their workstation. The Font Server is 100-percent compatible with the X11R5 Font Server and thus can either replace the existing Font Server or operate in conjunction with it, Gallium notes. The Gallium Font Server rasterizes formatted outline fonts, applies transformations to fonts, returns outline data for a character or a set of characters, and returns raw font data. The Gallium Font API, which is a library of Xlib-compatible routines, is intended for application developers who need to have finer control over the display of fonts than the standard X11R5 font model permits.

[illegible]

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n e w p r o d u c t s

Release 3.0 of ASK MANMAN/X will be available in the U.S. in April 1994 directly from the ASK Group and its distributors. User-based pricing starts at \$25,000 for an eight-user system. For a 128-user system, ASK MANMAN/X is

typically priced at \$250,000 to \$300,000.

Contact ASK Group, Inc., 2880 Scott Blvd., P.O. Box 58013, Santa Clara, California 95052-8013, phone: (408) 562-8200, fax: (408) 562-8810.

HP OpenView Product Integration

SynOptics Communications, Inc. has announced a new release of Optivity network management system, which is integrated with HP's OpenView, giving users greater control of their network from the work group to the enterprise. The new version is a result of SynOptics' participation in HP's OpenView Solution Partners program.

Optivity 4.0 is designed to enable users to create and manage virtual LANs logically and to reduce the time and expense of performing daily network administrative tasks. Virtual LANs are collections of uses that may be physically separated but need to be logically connected to each other and to specific applications and services.

SynOptics will also be releasing enhanced RouterMan and PathMan LattisWare solutions applications, which will also support OpenView. RouterMan provides network managers with status configuration and general health information of network routers. PathMan is said to be the only network management application that can trace the path of a packet of information through the physical, data link, and network layers of a network revealing the status of every device.

Optivity 4.0 for the HP OpenView UNIX platform is available and is sold both separately and as a bundled solution with HP OpenView UNIX. Optivity 4.0 is listed at \$5,995. The bundled solution is offered at \$21,745.

Contact SynOptics, 4401 Great America Parkway, P.O. Box 58185, Santa

Client-Server Manufacturing

Avalon Software Inc. has announced CIIM Version 8.6 for the ORACLE relational database, which offers new repetitive manufacturing capabilities to streamline manufacturing processes, including automated vendor releasing, planned order consumption, and automated material dispatching. It also features enhanced functionality for international manufacturers and new invoicing, credit memo, and check processing features.

CIIM comprises 12 fully integrated client-server applications, which manage manufacturing, distribution, and financials. CIIM on ORACLE was developed using the Oracle CASE and Oracle*Forms development tools.

The product is designed to automatically generate shipping schedules and material plans to suppliers and to reconcile material requirements against standing orders. It also minimizes manufacturing orders and execution planning.

CIIM 8.6 is also designed to simplify the movement of goods and materials between locations. New Proforma Invoicing capabilities are intended to enable manufacturers to track orders and preview customer invoices without creating an accounts receivable record. A new Accounts Payable feature gives users greater flexibility in creating and printing checks.

CIIM 8.6 is available for ORACLE Version 6.0 and ORACLE7 on all major UNIX platforms. CIIM applications may be purchased as a complete integration system or in stand-alone modules. Prices range from \$75,000 to \$750,000 depending on hardware configuration, number of users, and modules purchased.

Contact Avalon Software, 3716 East Columbia, Tucson, Arizona 85714-3414, phone: (602) 790-4214, fax: (602) 750-0822.

Clara, California 95052-8185, phone: (408) 988-2400, fax: (408) 988-5525.

Data Analysis

Visual Numerics, Inc. has announced PV-WAVE Point & Click Version 2.2, a self-contained end-user application combining data import, data management, advanced visualization, and analytical tools. It is compatible with the Motif window manager. PV-WAVE Point & Click can connect to the PV-WAVE Advantage to give users GUI-based data analysis with an optional 4GL programming environment.

The software is intended to enable

users to spot trends and interpret data using visual techniques, instead of scanning the rows and columns of numbers common in spreadsheets. It also includes the ability to save graphics commands to a file for easy graphics prototyping; the ability to save import/export commands to a file for prototyping of custom data import/export procedures; a CD-only release; and updated online help, incorporating all product enhancements.

A stand-alone copy of PV-WAVE Point & Click Version 2.2 costs \$2,495 for a single floating license. When Point & Click is bundled with PV-WAVE Advantage,

the cost is \$8,495. The new version supports UNIX-based workstations from HP and Sun.

Contact Visual Numerics, Inc., 6230 Lookout Road, Boulder, Colorado 80301, phone: (303) 530-9000, fax: (303) 530-9329.

Multiple Video Windows

RGB Spectrum has announced SuperView, a free-standing multiple video windowing system that displays up to four real-time windows on a single high-resolution monitor. Each video window can be positioned, scaled to full screen, overlaid with computer graphics, or overlapped with other video windows.

SuperView is said to guarantee real-time video performance under all conditions without burdening the host CPU or graphics controller. It accepts NTSC (or PAL) composite video and Y/C (S-Video) signals from up to four cameras, tape recorders, video disk, and teleconferencing systems simultaneously. It also accepts various high line rate video signals from FLIR and medical imagers.

The system supports software control to manipulate the video windows, adjust video parameters, and control graphics overlays. RGB Spectrum's optical X.TV software provides full integration under X Windows and is priced at \$750.

SuperView is priced starting at \$12,790.

Contact RGB Spectrum, 950 Marina Village Parkway, Alameda, California 94501, phone: (510) 814-7000, fax: (510) 814-7026.

Peripheral Sharing Device

Chase Research has announced IORACK, a rack-mount terminal/communications server for UNIX- and

LAN-HO!

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Before you embark on a journey into the maze of LAN connections, look to MiniSoft's terminal emulation software for complete PC-to-host connectivity.

Covering all industry-standard local area networks, MiniSoft 92 combines all the connectivity software into a single package. It provides you with the simplest, most direct route available, creating a friendly landscape of LAN connections.

So why pay extra for LAN connectivity when you can get the same LAN support in ONE package with HP and DEC terminal emulation. MiniSoft 92 provides connections for Telnet, Network Services, TCP/IP, Novell, Lan Manager, Banyan, Lantastic, Windows for Workgroups and many more. It also provides all the terminal emulation features upon which thousands of MiniSoft customers have come to rely.

Whether you are making serial or LAN connections in Windows, DOS or Macintosh environments, MiniSoft 92 will get you where you need to be at \$159.

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CIRCLE 98 ON READER SERVICE CARD

TCP/IP-based systems. IORACK provides 8 or 16 RJ45 asynchronous ports for connecting modems, terminals, printers, or data acquisition devices to TCP/IP networks. IORACK applications include remote dial-in LAN access, network printing, and high-speed serial data transfer.

IORACK features a menu-driven configuration system. Each port is individually monitored and provides baud rates of up to 115.2 kbps with full modem control. Chase host utilities allow these remote ports to be seen as local UNIX ports. Additional IORACK features include BNC/AUI connections, multi-sessions, SNMP, SLIP, telnet, rlogin, and tftp. IORACK is certified by UL, CSA, and FCC.

Pricing for the 8-port version is \$1,795, and for the 16-port version \$2,495. IORACK is covered by Chase's limited lifetime warranty. The product is available now through Chase Research and its distributors.

Contact Chase Research, 545 Marriott Drive, Suite 100, Nashville, Tennessee 37214, phone: (800) CHASE-US or (615) 872-0770, fax: (615) 872-0771, e-mail: jeff@chase.com.

Portable E-Mail

Qualix Group, Inc. has announced Portable Mail for Windows. The software is designed to enable the UNIX user to handle e-mail remotely on his or her PC or laptop computer. Portable Mail for Windows allows a UNIX workstation user to create a remote post office on any Windows laptop or PC. Users transfer UNIX mail files to a PC via popular communications software or by diskette. Users can then disconnect the modem and view their e-mail messages locally on the MS-Windows machine.

The graphical user interface is

Ethernet Print Server

AGILE has announced the 4550 E/PS, a stand-alone network print server for the Ethernet environment. Its multiple protocol support enables users to print from Novell NetWare, Apple EtherTalk, LAN Manager/Server, and TCP/IP simultaneously to any 4550 E/PS-attached network printer.

The AGILE 4550 E/PS is said to be easy to install and use, and no disk or tapes are required. It is physically attached to the network through either 10BaseT (twisted pair) or 10Base2 (thin wire) switch-selectable ports. Up to three printers can be connected using the two high-speed parallel ports and the serial port.

Other features include up to eight logical printers, password security, bi-directional communications, automatic protocol sensing, and statistics logging. The 4550 E/PS is SNMP-MIBI/II compliant for network resources management.

The AGILE 4550 E/PS is backed by a full two-year warranty. AGILE also offers optional warranties and services. The 4550 E/PS is available immediately at \$695, with quantity and VAR prices also available.

Contact AGILE, 825 Alfred Nobel Drive, Hercules, California 94547-1899, phone: (510) 724-1600 or (800) 538-1634, fax: (510) 724-9624.

reported to have a consistent Windows style throughout, featuring pull-down menus, an icon-filled toolbar, accelerator keys for most menu operations, a graphical customization window, and a status bar. The PC user can edit, sort, read, compose, forward, delete, and reply to mail and move mail to folders. Once reconnected to the UNIX workstation, all of these actions are said to be reconciled automatically. Users also are able to compose multiple messages simultaneously. Portable Mail for Windows is fully compatible with BSD mail and SVR4 mail. Users also have the flexibility to copy and paste text between Portable Mail for Windows and other Windows applications.

Portable Mail for Windows is priced at \$229. Introduction price for the software is \$195, and volume discounts and site licenses are available. Portable Mail for DOS is offered at \$149, and an upgrade for Portable Mail/DOS to Windows is available at \$50. Qualix offers a 30-day, money-back guarantee for Portable Mail for Windows and all other products.

Contact Qualix Group, Inc., 1900 S. Norfolk Street, Suite 224, San Mateo, California 94403, phone: (415) 572-0200, fax: (415) 572-1300, e-mail: info@qualix.com.

Touch-Screen X Terminals

Phase X Systems has introduced a new line of X terminals with Touch-Screen capability. T Series terminals come in monochrome and color, with monitor sizes ranging from 14 inches to 20 inches.

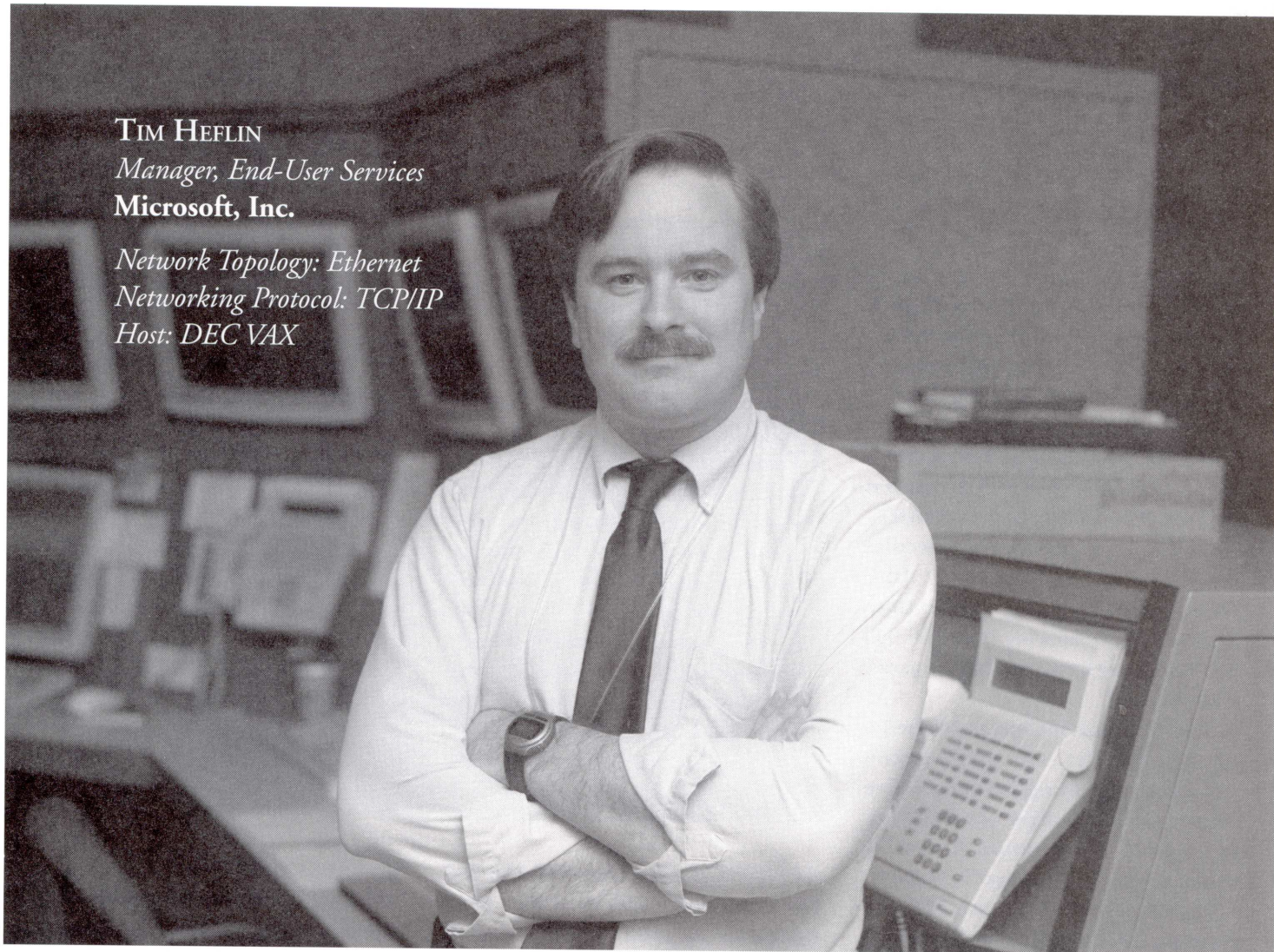
The T Series X Terminals include the 19TM, a 19-inch monochrome model with 1,280 x 1,024 resolution; the 14TC1, 15TC1, and 17TC1, which are 14-inch, 15-inch, and 17-inch color models, respectively, with 1,024 x 768 resolution; and the 20TC2, a 20-inch color model with 1,280 x 1,024 resolution. The T Series X terminals are compatible with HP-UX and other systems.

The touch-screen technology used in the T Series is based on a touch-sensitive glass panel and a Touch Interface Device (TID). When a user touches the

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Applied Concepts LAZER LINK III**Fiber Optic Bus Extender**

Applied Concepts has enhanced the LAZER LINK III, Model ACI-2003AD, to enable SCSI devices to be located up to 6,000 feet (2 Km) from the host computer. The LAZER LINK III is said to be a fully transparent SCSI fiber optic bus extender that supports a new generation of high-performance workstations, file servers, and disk and optical arrays.

The product is designed to let users surpass the 6-meter (19.7-feet) distance limitation of a single-ended SCSI bus and extends the distance to RAID arrays, SCSI laser printers, optical jukeboxes,



and tape backup systems up to 6,000 feet (2 Km) from the host computer.

The LAZER LINK III, which supports fast SCSI data rates of 10 MB per second, is completely transparent to the user and supports any combination of asynchronous and synchronous SCSI devices, the company notes. A single-ended SCSI connector on the rear panel connects to the host computer

screen, the TID maps the position of touch to a mouse-click action. Each T Series Terminal includes a Touch Interface software driver necessary to touch events appearing as X server mouse events.

The monochrome 19TM model is priced at \$3,395. The 14TC1 is priced at \$3,695. The 15TC1 is priced at \$3,895. The 17TC1 and 20TC2 are priced at \$4,195 and \$5,195, respectively. All T Series X terminals are high-performance X terminals measuring over 100,000 Xstones in performance benchmarks, notes Phase X.

Phase X Systems has published a special booklet on touch-screen technology and its applications. A free copy of this publication entitled "How to Improve Information Access by Touch-Screen Technology," is available.

Contact Peter Ghavami, Phase X Systems, 19545 N.W. Von Neumann Drive, Beaverton, Oregon 97006, phone: (503) 531-2400, fax: (503) 531-2401.

Version Control

Diamond Optimum Systems has announced Release 2.00 of its Version Control System-UX (VCS-UX). VCS-UX is designed to operate in a true client-server environment and to record all changes made to application software. It is intended to provide in-depth access control and automatically notify users who need to know when a specific action has been performed. VCS-UX is said to maintain a comprehensive documentation repository automatically and to provide impact and configuration information online.

Release 2.00 fully supports either stand-alone or combined HP-UX and MPE platforms. All project and audit trail data is kept in a database located on the HP-UX server. The open architecture of

the HP-UX platform allows HP 3000 and HP 9000 users to enjoy a common interface and single point of control for all of their software configuration and distribution management tasks.

Contact Diamond Optimum Systems, Inc., 22801 Ventura Blvd., Suite 105, Woodland Hills, California 91364, phone: (800) DOC-VCS1 or (818) 224-2010, fax: (818) 224-2009.

Distributed Visual Programming

Oberon Software has announced it will expand the capabilities of SynchroWorks, its visual programming environment, to support HP ORB Plus, HP's distributed-object development environment. SynchroWorks will enable HP ORB Plus users to visually assemble applications, without requiring them to know third-generation, object-oriented programming languages.

HP ORB Plus is said to be the only development environment that combines the complete CORBA 1.1 specification

from the Object Management Group (OMG) with the DCE standard from the Open Software Foundation. This lets users develop distributed object applications that can scale throughout the enterprise. HP ORB Plus includes the HP Distributed Object Management Facility, object services, developers' and administration tools, and sample applications.

SynchroWorks for HP ORB Plus is intended to support all objects with the OMG-IDL interfaces built in this environment, whether fabricated in-house, by third-parties, or using SynchroWorks Visual Editors. Application builders can combine these objects to visually assemble business applications. In addition, they can access external sources of data, including Oracle, Sybase, and Informix databases, as well as existing applications and libraries.

Contact Oberon Software, One Cambridge Center, Cambridge, Massachusetts 02142, phone: (617) 494-0990, fax: (617) 494-0414.

or peripheral, and no additional software is needed for installation and operation. Two LAZER LINK III units are connected by a standard duplex fiber optic cable to rear panel "ST" optical connectors.

The LAZER LINK III, model ACI-2003AD, external unit costs \$1,895, complete with 110/220 VAC input. UL, CSA, and TUV certified. Lower-cost board versions are available. The LAZER LINK III is available off the shelf.

Contact Applied Concepts, Inc., 9130 SW Pioneer Court, Wilsonville, Oregon 97070, phone: (800) 624-6808 or (503) 685-9300, fax: (503) 685-9099.

Remote PC Control

UniPress Software, Inc. and Triton Technologies, Inc. have announced beta distribution of CoSession/PC2X windows. PC2X now works with CoSession PC Hosts, allowing UNIX clients to be added to existing CoSession networks. CoSession is PC-to-PC connectivity software that lets users control other networked PCs from their PC desktops.

CoSession/PC2X is designed to turn a UNIX X Window into a virtual PC from which users can run DOS and Windows programs. Users can share files and transfer data by copying and pasting between DOS and UNIX applications.

CoSession/PC2X runs on Sun and HP workstations or X terminals. A single-user starter pack, which consists of one PC Host and one UNIX client, costs \$595. The CoSession/PC2X UNIX client side costs \$495, and the PC Host side costs \$125. The CoSession/PC2X PC Host side 10-pack (10 media sets and one manual) costs \$995. CoSession/PC2X is

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CHASE RESEARCH, GMBH ZETTACHRING 6, D-70567 STUTTGART, GERMANY, TEL 49.711.7287155, FAX 49.711.7287156

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Clarity Software Rapport Script

scheduled for general availability during the second quarter of 1994.

Contact UniPress Software, Inc., 2025 Lincoln Highway, Edison, New Jersey 08817, phone: (800) 222-0550 or (908) 287-2100, fax: (908) 287-4929.

Presentation Graphics

Visual Engineering, Inc. has introduced Ovation, PC- and Mac-like presentation graphics software for UNIX. Ovation is designed to offer the features of the best PC and Macintosh presentation software at a similar price point.

Ovation is a native X-Window application, so it can run on X terminals, workstations, or PCs running X software anywhere on the network. It also is able to enable dragging and dropping graphics from other UNIX applications, multi-display presentations, hyperlinks to trigger UNIX multimedia features, extensive graphical online help, integration with UNIX databases and analytical applications, and graphic arts features such as translucency and texturing.

Ovation also includes built-in outlining to quickly develop presentation text, a graphical slide sorter, support for speaker's notes and audience handouts, on-screen slide shows (including a royalty-free run-time viewer), extensive drawing and charting tools, and a complete library of editable clip art.

Ovation is available immediately on all major UNIX platforms, including HP 9000. Priced \$795 per user, Ovation is distributed directly, as well as through systems integrators and key strategic partners. Visual Engineering provides free customer support and updates for Ovation within 60 days of installation.

Contact Visual Engineering, 2025 Gateway Place, Suite 318, San Jose,

UNIX Word Processing

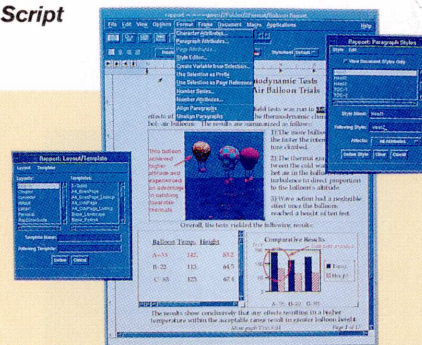
Clarity Software has announced Rapport Script, an object-based package designed for casual users and creators of complex reports, newsletters, presentations, and documentation.

The product features a "basic" mode that is easy and straightforward, with common functions available by point-and-click on the control panel, paired with an "advanced" mode that allows power users access to sophisticated layout and formatting options. In-place creation and editing of non-text elements, such as spreadsheets, drawings, charts, images, and sounds, is available without having to pop up new windows. In addition, the word processor supports slide presentations as an alternate form of communicating, complete with master slides, slide templates, and a "thumbnail" view of the entire slide set.

Data types may be mixed, allowing for images or audio annotations within spreadsheet cells, drawings on photographs, and voice comments in the margins of text. Users may integrate new or existing applications with Script capabilities by using Rapport's Facility for Linkage and EXtension (FLEX). FLEX is said to be the only customizer that enables the use of programming languages, user interface tools, and debuggers users already have and know.

Rapport Script is available for HP 9000 Series 700 workstations and others and is priced at \$695 for a single floating license. An upgrade from Script to Rapport Pro, which provides for automatic message conversion to and from popular UNIX, PC, and Macintosh applications, is \$295. Rapport Pro is priced at \$895 for one floating license.

Contact Clarity Software, Inc., 2700 Garcia Avenue, Mountain View, California 94043, phone: (415) 691-0320, fax: (415) 964-4383



California 95110, phone: (408) 452-0600, fax: (408) 452-0632, e-mail: info@ve.com.

Database Management

Proactive Systems has announced a major new version of FLEXIBASE/SQL, its client-server database management utility for HP ALLBASE/SQL, IMAGE/SQL, ORACLE, and SYBASE. FLEXIBASE/SQL uses an MS-Windows user interface for easy management and optimization of SQL databases. The new release now includes the ability to rebuild DBFileSets using new file space definitions. This can be used to save disk

space or optimize tables. It also provides improved graphical representation of file space used and the ability to record and display trends in performance-related statistics based on table, index, and file space data.

A new Authority Manager tool for displaying and managing database authorities has been added. A module for generating the working storage section of a COBOL program for either Tables, Views, or any Select statement also is provided. Users also can generate a complete COBOL program, which generates a report similar to that from an

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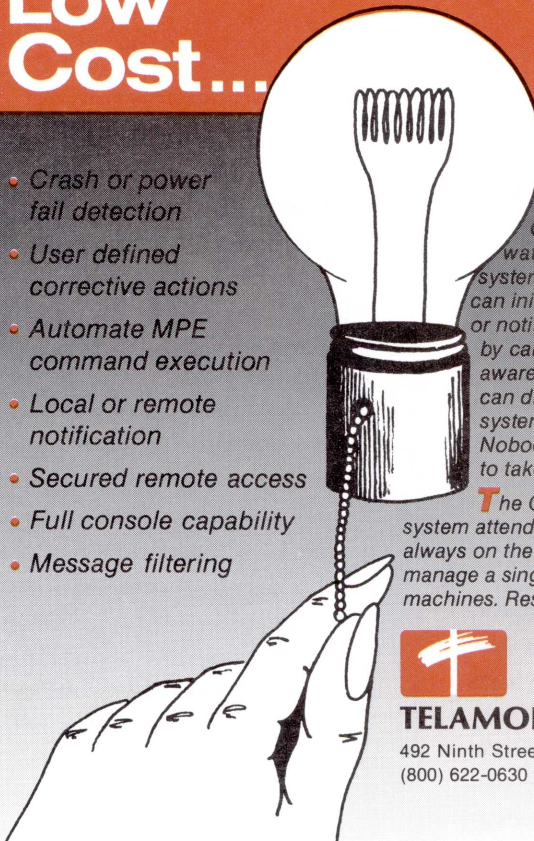
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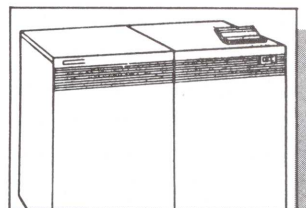
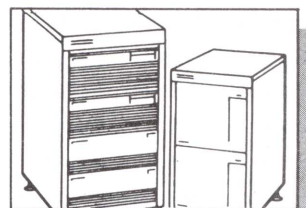
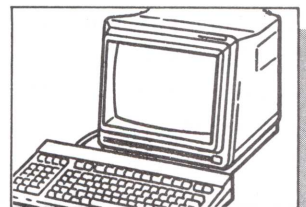
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equivalent Select statement in ALLBASE/SQL.

The new release has been fully certified for use on the new ALLBASE/SQL "G" release and supports the new facilities introduced in that version.

Contact Roger Lawson, Proactive Systems, Four Main Street, Los Altos, California 94022, phone: (415) 949-9100, fax: (415) 949-9111.

Code Analysis

PROCASE Corporation has announced SMARTsystem Version 3.0, which specializes in analysis and comprehension of very large bodies of C code. The product is designed to analyze more than 1 million lines of code and can handle code that will not compile successfully, incomplete systems, or code targeted for other hardware platforms or embedded systems. SMARTsystem is aimed at helping programmers and managers understand and fix large amounts of unfamiliar C source code by graphically displaying code structure, providing information about errors and dependencies, and performing impact analysis.

Release 3.0 includes a makefile analyzer to facilitate building the database and getting started. It also allows the user to work with a richer set of information in the Call Graph by showing dependencies involving global data and function pointers in addition to the former display of function and library calls. The product also provides new mechanisms for uncovering undefined CPP macros.

PROCASE is now shipping SMARTsystem Version 3.0. SMARTsystem runs on HP 9000 Series 700s and other platforms.

Contact PROCASE Corporation, 2694 Orchard Parkway, San Jose, California 95134, phone: (408) 433-9500, fax: (408) 435-2600, e-mail: sheila@procase.com.

Document Management

NSD has announced Networked Electronic Report & Document Distribution (NERDD), designed to merge data processing, office automation, imaging, and telecommunications into a suite of easy-to-use Windows- or Motif-based electronic information management products. The products are designed to integrate both computer-generated and non-computer-generated documents into one cohesive, open platform solution.

NERDD can scale from a stand-alone system to a very large networked system to capture, retrieve, manage, annotate, and distribute documents of varying sizes, compositions, and origins on open platforms. These systems handle file management, transaction processing, image processing, document storage and retrieval, structured data inquiry and review, and electronic forms overlay. The sophistication levels of NERDD systems can vary from large "electronic file cabinets" to complete electronic text and image processing, work-flow, and distribution capabilities.

NERDD is available for HP 9000s and other UNIX servers and for HP 3000 hosts. The base system price is \$12,000. Server licences are priced based on CPU size and start at \$14,400. Client pricing ranges between \$54 and \$540 per client.

Contact NSD, 1400 Fashion Island Blvd., Fourth Floor, San Mateo, California 94404, phone: (800) 538-3818 or (415) 573-5923, fax: (415) 573-6691.

Information Search Engine

Personal Library Software (PLS) has announced an Internet server version of its information search engine. PLServer works with Mosaic, the ubiquitous interface to the World Wide Web. PLServer allows individuals and organizations to publish their information over the net at affordable prices, using technology that was available previously only to large commercial publishers, the company notes.

PLServer provides features such as natural language querying, relevance ranking, search-by-example, and dynamic concept discovery. It uses the same PLS engine that resides at the heart of products and services from leading information companies, such as America Online, Dialog, Dow Jones, Financial Times Information Services, Congressional Quarterly, Apple (AppleSearch and

eWorld), Grolier Electronic Publishing, Macmillan New Media/Paramount, Mainstream Data, and Wave Systems.

The information server is said to provide 24-hour-a-day availability and true live updates, with transaction-protected concurrent access by searchers and updaters.

PLServer has virtually no limits in terms of the size and number of databases and records it can support nor in terms of the number of concurrent users. It runs on HP 9000s and other UNIX servers. Versions for Mac and various incarnations of Windows are planned. The Mosaic client is publicly available for free from NCSA (National Center for Supercomputing Applications, at the University of Illinois, internet address: mosaic@ncsa.uiuc.edu) and can run on many computers, including Macs and Windows PCs, in addition to UNIX computers. General release of

Version 1.0 was planned for later this spring. Pricing has not been set but will include options for commercial and non-commercial use.

Contact PLS, 2400 Research Blvd., Rockville, Maryland 20850, phone: (301) 990-1155, e-mail: info@pls.com.

New from Cincom

Multimedia Products/Services

Cincom Systems, Inc. has announced Systems Innovation Office, designed for developing and bringing to market unique database-oriented application solutions that will help re-engineer organizations worldwide. These solutions will be built using advanced, reusable database, multimedia, and object-oriented technology to enable developers to build efficient, state-of-the-art applications.

Key offerings from Cincom's Systems Innovation Office are Multimedia Workbench, an integrated, networked development environment that enables organizations to quickly and cost-effectively build multimedia applications; Multimedia Diamond DataPak, a pre-configured turnkey package containing all software, hardware, connectivity, migration, and access service components to integrate a mainframe server, a LAN server, and PC client environment; Multimedia University, a comprehensive, 4 1/2-day, lecture/lab training program in developing multimedia applications; and Object-Orientation StarterPak, a joint product venture between Cincom and ONTOS, Inc. providing hands-on experience with an object-oriented environment.

The Multimedia Workbench is available now for \$4,995. The Multimedia Diamond DataPak is available now for \$1,995.

Data Analysis

Cincom Systems, Inc. also announced XpertRule Analyser Professional, an advanced professional data analysis tool. XpertRule Analyser Professional helps organizations uncover a wealth of information hidden in their databases.

XpertRule Analyser Professional is available as a stand-alone product or as an enhancement to XpertRule, Cincom's Microsoft Windows-based knowledge specification and application generation system. XpertRule includes a standard data analysis tool.

XpertRule has automatic induction, making it easy to discover rules and patterns in data; XpertRule Analyser Professional allows the developer to interact during the rule induction process. While XpertRule builds decision trees from discrete value outcomes, Analyser Professional can also induce decision trees from numeric outcomes. XpertRule Analyser Professional enables data fields to be produced by deriving new fields from other fields in the data file. It then can process the entire file and export a new file with one or many data fields added. XpertRule Analyser Professional also uses genetic algorithms to search for rules within the data and generate pattern rules and multiple decision trees.

XpertRule Analyser Professional can generate decision trees as C code and can be integrated with XpertRule to deliver automated systems based on knowledge uncovered during data analysis. XpertRule runs on the PC and generates source code in COBOL, C, Pascal, and MANTIS (Cincom's application development language) for deployment to other systems. XpertRule MANTIS applications are fully portable and can be deployed to a wide range of systems, including HP 9000s.

XpertRule Analyser Professional and XpertRule are \$995 each. Both products are available immediately. XpertRule evaluation copies are available at \$49 and include a limited-use version of the product and complete documentation.

Contact Cincom Systems, Inc., 2300 Montana Avenue, Cincinnati, Ohio 45211-3899, phone: (513) 662-2300, fax: (513) 481-8332.

Engineering Postprocessing

Computational Engineering International, Inc. (CEI) has announced EnSight Version 5.1, now available on systems from all major workstation vendors, including Hewlett-Packard.

EnSight (short for "Engineering insight") is used to analyze, interpret, and display the results of computational engineering simulations for all finite element modeling applications, including structural analysis, computational fluid dynamics, and combustion modeling. Support for dozens of the most popular analysis packages, including ANSYS, MSC/NASTRAN, LS-DYNA3D, FLUENT, FIDAP, and STAR-CD are included with EnSight. The system provides complete engineering postprocessing capability, from initial model verification to video animation. In addition, EnSight has advanced postprocessing features not found in any other package.

In order to facilitate the handling of large datasets and efficiently use network resources, EnSight was designed to distribute the postprocessing work load. Data I/O and compute-intensive activities are performed by a server process. The server transmits graphical data to a client process running on a graphics workstation. The client handles all user-interaction and graphic rendering. When

distributed between a server and a graphics workstation, EnSight leverages the strengths of both machines. Both tasks also can reside on the same machine.

EnSight originally was developed and refined in the supercomputing world and marketed by Cray Research under the name MPGS. CEI was created by former Cray employees earlier this year.

CEI provides a unique and flexible licensing policy for EnSight customers. Only the EnSight server portion is licensed, and customers are free to copy the client to any applicable system. The needs of multiple users therefore can be met with a single license. Prices begin at \$8,500 for commercial customers. Academic discounts are available.

Contact Tom Palmer, Computational Engineering International, Inc., P.O. Box 14306, Research Triangle Park, North Carolina 27709, phone: (919) 481-4301, fax: (919) 481-4306.

Help and Information System

Quadralay Corporation has announced Global Wide Help & Information System (GWHIS). GWHIS allows third-party developers to add online documentation and context-sensitive help to their applications. This documentation may consist of plain text, rich format text, hypertext, images, audio, and/or video animation, and can be distributed easily either locally or over a wide area network such as the Internet.

GWHIS consists of two primary components: an application programming interface (API) and a hypermedia viewer (based on technology licensed from the NCSA Mosaic project). Several ancillary conversion programs are also available, allowing end users to easily convert existing documentation into GWHIS' native HTML format.

GWHIS is available on HP 9000 Series 700s and other UNIX platforms. Fully functional evaluation copies are available upon request or via anonymous ftp from [ftp.quadralay.com](ftp:ftp.quadralay.com).

Contact Quadralay Corporation, 8920 Business Park Drive, Austin, Texas 78759, phone: (512) 346-9199, fax: (512) 346-8990, e-mail: info@quadralay.com.

New from HP

OpenView 4.0

HP has announced the HP OpenView Distributed Management Platform 4.0. Version 4.0 marks the first appearance of technologies selected by the Open Software Foundation (OSF) for the Distributed Management Environment (DME) network-management option (NMO) in product form.

The HP OpenView Distributed Management Platform includes the HP OpenView Windows user interface, application programming interfaces, and services. It also features dynamic network discovery, a communications infrastructure to integrate and distribute multiple applications, and several standard and proprietary management protocols. The platform supports the XMP API, the SNMP and CMIP protocols, and associated standards. It also includes an option for a structured-query-language database.

The communications infrastructure now contains common communications infrastructure and industry-standard API the selected by OSF for the DME NMO. The platform offers users and developers the ability to develop portable software for managing industry-standard and legacy systems and network devices.

Version 4.0 has been designed to comply with the telecommunications management network (TMN) standards,

which were established by the telecommunications industry for the management of internal operations networks. The platform also includes distributed and scalable services for event-handling, access to object definitions adhering to Guidelines for the Definition of Managed Objects, an object registration service, and powerful developer tools. Version 4.0 developer tools are designed to simplify the task of building XMP and CMIP management solutions.

The HP OpenView Distributed Management Platform 4.0 is expected to be available in May for HP-UX and SunOS-based systems. Current UNIX-based OpenView customers receive upgrade credits toward the purchase of Version 4.0. Version 4.0 offers full backwards compatibility with Version 3.x by supporting all Version 3.x APIs.

The HP OpenView Distributed Management Platform 4.0 starts at \$10,000, the HP OpenView DM Communications Infrastructure is priced starting at \$5,000, and the HP OpenView DM Platform Developer Kit starts at \$24,150.

Contact HP at (800) 637-7740.

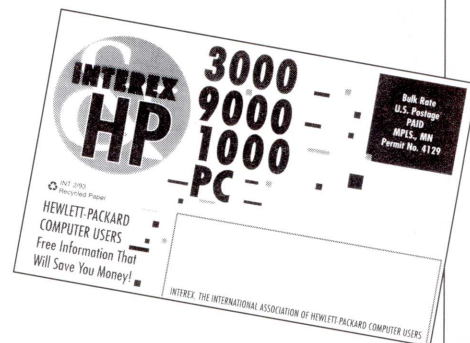
Low-Cost X Terminals

HP has announced HP ENTRIA, a new line of low-cost X terminals intended to be "the ultimate terminal upgrade." It is designed to replace text-based terminals with its multi-session graphical desktop that continues to display both old and new applications simultaneously. The release is part of HP's Enterprise Desktop Initiative, which is intended to provide low-cost desktops for collaborative business environments.

Terminal emulation is offered for IBM 3270, DEC VT320, HP term, and xterm. HP VUE provides visual access to multiple displays and enables users to cut and

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☐ HP 1000

☐ HP 9000

☐ PC

For more information, contact Liway Gimenez, Interex, P.O. Box 3439, Sunnyvale, California
94088-3439 USA, Phone (408) 747-0227, FAX (408) 747-0947.

paste between applications residing on different hosts. The ENTRIA operates with the recently released HP ENWARE X Station Software, which is designed to enable system administrators to configure X terminals and install application updates from a central location.

Ergonomic features include a small footprint and optional side stand, for minimal desk space requirements; convection cooling, for quiet, fanless operation; and Energy Star rating, denoting low electrical consumption. Security features include a security loop, for preventing opening or removal of the terminal; password secure setup, which provides three levels of access control to configuration screens; and client authorization, for choosing the applications to run on each HP X station. Audio and Dynamic Host Configuration Protocol support and a PCMCIA port are also included.

HP ENTRIA pricing ranges from \$995 for a 14-inch monochrome monitor to \$2,895 for a 17-inch color monitor with 1,024x768 resolution.

X Terminal Management

HP has also announced the ENWARE X Station Software family, which includes ENWARE X Station Software 5.1, ENWARE X Terminal Manager 1.0, and ENWARE 3270 1.0. These releases are part of HP's Enterprise Desktop Initiative, which is intended to provide low-cost desktops for collaborative business environments.

ENWARE X Station Software is designed to handle the administration of X terminals with ease and to shield users from complex UNIX commands. The software provides Motif Window Manager and HP VUE interfacing and terminal emulation for IBM 3270, DEC VT320, HP term, and others.

The software is designed to enable simultaneous X terminal access to any application on HP hosts that comply with the X Window System. The software comes on a multi-host CD; one CD contains all the code for HP, Sun, IBM, and SCO host platforms.

ENWARE X Terminal Manager is designed to provide simple administration of large groups of X terminals from one location. The terminal manager features automatic discovery of site, hosts, and X terminals; automatic assignment of an address to an X terminal when it is connected to the network; easy addition of new branch locations and X terminals; and centralized troubleshooting and help-desk features that are accessible to remote sites.

HP ENWARE X Station Software 5.1 is priced at \$695. HP ENWARE X Terminal Manager 1.0 is priced at \$495.

DAT Drive

HP has announced the first digital data storage-2 (DDS-2) tape drive to be supported across the majority of HP systems. This stand-alone product—the HP Series 6400 Model 4000DC—is said to be the highest-performing DDS-2 DAT drive in the industry. The new drive extends HP's range of DAT products and complements the existing Model 2000 and Model 2000DC.

The Model 4000DC incorporates the latest version of the industry-standard DDS format which, combined with the new 120-meter DDS-2 cartridges, provides a native-mode capacity of 4 GB. HP believes the 510 KB/second native mode transfer rate is significantly faster than any other 4-mm DAT drive on the market. The use of data compression allows 8 GB to be backed up on a single DDS-2 120-meter cartridge in around two hours, HP notes. The Fastsearch

feature is designed to enable users to access data in seconds.

Data interchange and read/write compatibility with the Model 2000 and 2000DC reportedly is guaranteed, because the Model 4000DC recognizes 60-meter and 90-meter DDS cartridges and reverts to writing in the original DDS format, giving a native capacity of 1.3 and 2.0 GB.

The drive is supported on the majority of HP 9000 systems, both Series 700 and Series 800. Additional support for the HP 3000 systems and for HP 9000 Models 890 and T500 is planned for summer 1994.

Flat-Panel Display

HP has also announced what is said to be the first stand-alone, color, flat panel display for workstations. The display is targeted at financial traders, Japanese markets, and environments where desktop space is limited. The release is part of HP's Enterprise Desktop Initiative, which is intended to provide low-cost desktops for collaborative business environments.

The 12-inch color display offers 1,024x768 resolution and 512 displayable colors. It is four times lighter and four times smaller than a 17-inch CRT and consumes half the power, HP notes. It is designed to provide plug-and-play capability with various workstations and is offered as an option to HP's new HP 9000 Model 712 workstation.

The flat-panel display is priced at \$13,995.

Attention vendors: New product announcements should be sent to New Products Editor, hp-ux/usr Magazine, Interex, P.O. Box 3439, Sunnyvale, California 94088-3439, USA.

Deadline for submission is two months prior to publication.



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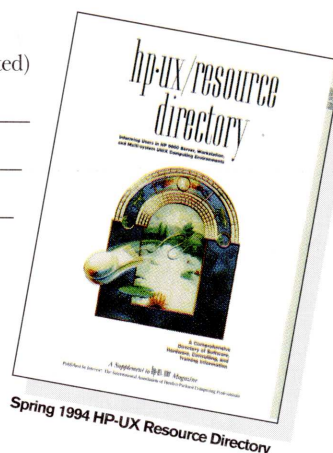
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